The Earth Science DIGEST

35¢

May, 1953

AVAILABLE SOON!!

the NEW and REVOLUTIONARY

W-B FACETING UNIT

- **In preparation for over two years**
- **Planned and designed by Dr. Willems**
- **Engineered and developed by Wm. Barabas**
- **In manufacture now by Lapidary Industries**

This portable, compact, complete and precision-built machine embodies many new and immensely practical ideas. It will be on display in operation at the St. Louis convention of the Mid-west Federation June 26-27-28. Don't miss the opportunity of seeing and inspecting it there.

Watch for Later Announcements

BARGAIN CORNER FOR MAY

Introductory Offer

Six (only) 35mm. Kodachrome slides in full color on the subjects of

Gem Materials	Facet Cutting
Cabochon Stones	Great Barrier Reef Corals
Cabochon Cutting	Lincolniana

STATE YOUR CHOICE—$3.00 POSTPAID

J. DANIEL WILLEMS

Lock Box 1515 AMERICAN FEDERATION OF MINERAL SUPPLIERS **Chicago 90**

The Earth Science Digest

A MAGAZINE DEVOTED TO THE EARTH SCIENCES

Volume 6 **May, 1953** **Number 6**

IN THIS ISSUE

J. D. WILLEMS — *Business Manager*
B. J. BABBITT — *Editor*

Editorial Staff

W. H. ALLAWAY
WILLIAM J. BINGHAM
R. P. MACFALL
KIRTLEY F. MATHER
JAMES O. MONTAGUE
H. H. NININGER
WILLARD H. PARSONS
RICHARD M. PEARL
KEN RUSSELL
BERNICE WIENRANK
J. D. WILLEMS
B. H. WILSON
C. W. WOLFE
H. P. ZUIDEMA

Communications for editorial consideration should be sent to the Editor, B. J. Babbitt, 140 Northgate Road, Riverside, Illinois

• Published bi-monthly by The Earth Science Publishing Co., [Inc.], Box 1357, Chicago 90, Illinois • Subscriptions: U.S. and possessions and Canada, $2.00 per year. Other countries, $2.50 per year • The Earth Science Digest, copyrighted 1953 by the Earth Science Publishing Co., [Inc.], in U.S.A. All rights reserved. Title registered in U.S. Patent Office • Permission to quote or reprint articles from this magazine will be considered upon written request to the Editor • The Earth Science Digest is the official publication of the Midwest Federation of Mineralogical Societies • The Earth Science Digest is open to articles of earth science interest. No manuscripts, photographs, sketches will be returned unless accompanied by ample first-class postage.

CHARTER LIFE SUBSCRIBERS

JOHN C. BOHMKER
R. E. CALIGA
H. D. COHN
J. E. FARR
JAMES O. MONTAGUE
H. T. PERRY
THOMAS J. SCANLON
H. R. STRAIGHT
CHICAGO ROCKS AND MINERALS SOCIETY
EARTH SCIENCE CLUB OF NORTHERN ILLINOIS
MARQUETTE GEOLOGISTS ASSOCIATION

These subscriptions are currently available at $50.00

Quartzsite Localities

by Dave Yoeman and Jack Schwartz
Whittier Gem & Mineral Society, P.O. Box 66, Whittier, Calif.

Quartzsite, mecca for the mineral collector, is the first town in Arizona after leaving Blythe, California, on U. S. Highway 60.

A great many minerals have been found around Quartzsite, and the authors have collected the following in the area: hematite with quartz crystals, talc, galena, siderite, malachite, chrysocolla, limonite (pseudomorphs after pyrite), quartz crystals (some with inclusions), gypsum, gold and natroalunite.

Crystal Hill is a very famous locality from which have come fine quartz crystals and crystal groups. There have been reports of pyrite crystal inclusions in quartz from this spot. Transparent crystals, singly and doubly terminated, are sometimes of optical quality. Many of the specimens are readily identified as left and right handed crystals and some show the characteristic etching of penetration twins. An extremely interesting crystal was discarded by previous collectors, apparently because they thought it to be merely the termination broken off a crystal. Actually it is a complete doubly terminated quartz crystal, highly distorted. Many fine specimens may still be obtained at this locality.

Approximately four miles southwest of Quartzsite is found an outcropping of quartz and talc schist. A large portion of the quartz is crystallized and contains perfect black crystal plates of hematite. Although many fair specimens may be easily obtained, good pieces require very careful work with chisel, gad and hammer, since the hematite crystals are very fragile.

Many of the hills in the Quartzsite area are literally covered with limonite, pseudomorphs after pyrite crystals. Some of the specimens have perfect crystal form and range up to two inches in size.

The rare mineral natroalunite, which is a basic sodium aluminum sulfate, is found on Sugar Loaf Butte, about three miles west of the town. As payment for a few minutes' work, the collector can obtain as many specimens as desired of fine massive natroalunite.

Several talc mines and prospect holes are located slightly east of Sugar Loaf Butte. The talc is generally a pure white and readily seen from the highway. In the talc are quartz seams which contain massive galena.

Fine large cleavages of siderite are found in a prospect digging about one-half mile south of the hematite locality. In the same spot are found flat radiating groups of malachite crystals. These apparently were deposited in faults in the quartz. Some of the quartz is well crystallized and contains inclusions of hematite flakes.

Most of the alluvial deposits around Quartzsite contain gold and there are several mines in the area. Small flakes and nuggets may be obtained by panning and dry washing.

Further exploration of the Quartzsite country should yield many fine and varied mineral specimens to the diligent collector. After every trip the authors immediately plan to return at the earliest opportunity, for each trip brings new and beautiful specimens.

EARTH SCIENCE QUIZ No. 6

Test Your Knowledge! How much do you know? How many of the following terms can you define? They are arranged in three groups with progressive difficulty. Group 1, things everybody should know; group 2, things good "rock-hounds" should know; group 3, things which experts might be expected to know. Try your luck. To score—add up total points as indicated by the group number and rate as follows: 1-6 poor; 7-13 good; 14-20 excellent; 21 perfect. (Answers on page 30.)

a. (1) anhydrite
b. (1) halite
c. (1) shale
d. (1) quartzite
e. (1) cast (geology)
f. (1) opal
g. (2) ochre
h. (2) black-jack
i. (2) sheen
j. (3) phosphorescence
k. (3) bloom (mineralogy)
l. (3) lode

Into the Dinosaur Country

by Wayland W. Magee
Bennington, Nebraska (Photos by the author)

It all started in 1951 when I heard about a little brown pocket-sized book called "Prospecting for Uranium." This publication is sent out by the Superintendent of Documents of the U. S. Government Printing Office in Washington, D. C. For me it has been well worth the forty-five cents the book cost for it started or, rather, revived in me a love of rocks and the out-of-door life that goes with their study.

It came about this way. I graduated with a major in Geology and three years' graduate work in law and then, the first I knew, I found myself married and in the baby business on a Nebraska family farm. That was back about 1910 and I have been pretty steadily at it for forty years. When I eased up in 1951, after turning the farm work over to my elder son, I had a headquarters farm home, two girls and two boys all educated, married and self-supporting and time on my hands to revert to Geology. It was about this time that I found the little brown book and tucked it in my bag as my wife and I packed to drive south for a win-

Summer Hill Farm truck on road in dinosaur country along Cheyenne River, Wyoming.

A noonday stop in the Black Hills of South Dakota with Charley Baker of Sundance, Wyoming.

ter in Arizona.

Most of the knowledge we now have of radio activity has been acquired since I got out of the University and I knew little or nothing about it nor how badly our government wanted to uncover new sources of Uranian ore. The little brown book told me that today uranium is the only naturally occurring substance that can be used as a basic raw material in large scale production of atomic energy. Of course I read the papers and I had seen how fast uses for atomic power were growing.

Down there in the Arizona sunlight I had lots of time to think and to read my little brown book. I learned from it that there is some uranium in all rocks and in most water, and that you can locate it in a number of different ways.

You can use ultraviolet or fluorescent light. That is the "black light" made by special lamps which work on storage batteries or high line current in any dark spot. The light from the lamp is helpful in detecting the presence of some uranium bearing minerals, such as autunite when used in connection with the so-called "Bead Test." Any powdered rock melted onto an iron wire and dipped into sodium fluoride (roach powder) so as to make a bead will fluoresce yellow-green if there is any uranian present when it is put under the light.

There is also the radio activity test, for uranium is always "hot," that is, the ore gives off certain rays (Alpha, Beta, and Gamma) that you can not feel, see, or hear but which can be caught and counted through the use of a Geiger Counter or other scientific instrument.

Then, if you want to, you can do as I did, use a photographic film. I was in a dentist's office having an X-ray taken of my teeth and the dentist had just put one of those small films into my mouth when the thought struck me

that I could use that same kind of film to find out if a rock had any uranium in it. The process is simple. You put some metal object (I used a paper clip) between the film and the rock and leave it for a few days. The rays from a "hot"rock will act just the same as daylight will and cause the shadow of the paper clip to appear on the film when developed. No uranium, no shadow. Very simple.

There are a number of other ways to detect uranium, but the easy one is to get a Geiger Counter. They cost from about a hundred dollars up and you can carry them around with you for they weigh only five to ten pounds. Counters all work about the same way. They have a gas cell called a "probe" and when you get that cell near a radioactive object the rays I was talking about will enter the cell and ionize the gas in such a way that it "shorts" an electric current and you can hear a click through the ear phones just as you can when some neighbor lifts the receiver on a party-line telephone. That is where the "count" comes in. Strong rich ore will make the counter buzz like a rattlesnake while ore that is not so rich will sound like the telegraph operator's key down at the depot.

Now that tells you how you can find the ore in the rocks. I know someone will be wondering what kind of rocks to look for. At least that was the way my mind worked. That is also all set out in the little brown book, but it takes some study to learn what to look for. In my case, I don't like to study much so I began to go to Museums and look at the samples the other fellow had brought in. I went to museums and rock collections and rockhound shows all the way from Michigan to Mexico last year and I also went to mines and to reduction plants. That is where they take the uranium out of the rocks and I picked up lots of samples of uranium ores. I have only some fifty kinds now and there are about seven times that many to find and learn about.

Then because of my early training I knew that there were some strata on the outside of the earth that had more than their share of uranium ore. The little brown book told me what states and what places were likely places to look for these layers. I found them and then I found others. By this time I was thoroughly inoculated with what one old miner called "Rim Rock Itch." In fact I had such a bad case I had to do something about it. My classmates at the University and the boys I worked with on the U.S.G.S. as

Lyle Griffith near Carlile Jct. made the first Uranium find to be leased by Homestake Co. in Northern Black Hills. He was cutting wheat when I called and took me in to dinner.

a student all helped me with what I call "Learned Literature" and with all this reading I had plenty to do.

One thing led to another. First I was thrilled when one of the dental films I had put on a rock down in Arizona really showed the shadow of the paper clip when a dentist developed it for me. I was all set up for I had found radioactive rock in a place where

the little brown book did not give it a chance to be. That led to a Geiger Counter and then I had to have a "look see" at the country where uranium ought to be found. That took me out onto the Colorado plateau in the Navajo country at a season of the year when no white man ought to be out there, anyhow, not in a big heavy car very low slung. A snow storm caught me and it took a lot of Indians to pull me out.

Dr. A. L. Inglesby, graduate of Northwestern University Dental School, 84 years young, rockhound of Torrey, Utah.

That experience led to a truck. When I got the truck I was afraid to call it a mining truck for my kids would all laugh at Dad turning "prospector," so I called it my "fishing truck." Any old man can have a fishing truck but there are only a few of them with a truck like mine. I wanted a place to sleep in it and I wanted it light and tight so I could keep reasonably clean. I rigged up an outfit all right and I used it for a six thousand mile trip I made last year. Now I am just back from another trip this past summer which took me into seven states and I brought home radioactive rock picked up in six of them. It is a glorious truck to camp out in but it is sort of like me. It is a poor mountain climber — weak in the knees. I have no reduction gear, but I am going to get one for I have been lots of places in that truck no self-respecting truck should be asked to go. The best hill climber is a four-wheel drive Jeep but I do not like them on the black top or to sleep in.

During my second winter in the Southwest I had some ideas of my own as to how to locate uranium ore. In the Navajo Indian country it looked simple. Just find the oldest Buck Indian in the tribe and give him a "buck" to tell or take you to the place he gets his yellow paint to paint his face or body. Then if the stuff he showed you did not turn out to be yellow ocher or iron oxide it might be carnotite, a secondary common uranium ore. Also it occurred to me that the Indian school boy was the logical prospector to use the dental film method under super vision and this idea I passed on to the authorities.

The "Learned Literature" and an Atomic Energy Commission's RMO No. 563 state that "in acidic igneous rocks, uranium is approximately 1,000 times as abundant as gold, 100 times as abundant as silver and perhaps equal in abundance to tin, molybdenum and arsenic." However, so far as my present experience goes, there is now being mined far more uranium from the sedimentary rocks than from the pegmatites and the hydrothermal veins all counted together. No one as yet has evolved a tenable theory as to the origin of these secondary deposits, but it has become clear that they are water born and for the purposes of prospecting it is not important whether they have been centralized by aqueous movement from below or above. It is well established that some affinities have developed both for dinosaur bones and other favorable material and suitable host rock, even coal. So another of my approaches has been to hunt out fossil beds of Jurassic or Triassic time. This is easily done and running even my poor Geiger Counter over the bones

will disclose the presence or lack of radio active material in the locality. That is why I call this story "Into the Dinosaur Country" for it is in those horizons that some large discoveries have been made. Uranium has also been found in Cretacious Coal seams so I have looked around at lots of lignite dumps, and the thought has come to me that I might find a concentration of uranium at the base of old burned-out coal seams, many of which are to be found in Wyoming on the northeast of the Big Horn Mountains where I go to fish trout. The carbonaceous deposits of vanadium, cobalt and the oil shales must not be overlooked.

Then I wrote a popular story and published it in a trade journal of the rock hounds requesting word from readers of prospective locations of new finds. From this came new fields for investigation. And always on the road I watched the structure of the country.

That makes me think of my wife's first find. The first trip south I made after I caught Rim Rock Itch, I drove over the Apache Trail down in Arizona near Mesa. On the trail I found a big construction gang at work. They had just made a blast in hard rock before the road patrol signalled me to drive through the blasted section. The road was covered with big chunks of loose rock just blown from the bank on one side and with my low-slung car I was in grave danger of dragging out the differential. I had no time to stop and look around and I had to keep my eye on the road or go into the canyon some hundreds of feet below. It was in this narrow dugway that out of the corner of my eye I saw a wide canary-colored streak in the wall rock close to me. I then thought to myself that I had found some exposed carnotite ore but the road patrol and the cars behind would not let me stop. And anyhow, I did not want to share my "find" with everyone. I had to drive on, and it was the next winter before I got back to that wonderful scenic road up to the

U. S. Geological Survey Field Camp on Taylors Ranch near Pumpkin Buttes in Powder River country of Wyoming.

The Lyle Griffith Farm Family of Carlile Jct., Wyoming. Lyle made the new find on his farm, now leased to Homestead Co.

Roosevelt Dam. It was about noon and we were going very slowly so as to observe the wall rock and not overrun my "find." Then we came to the construction crew still on their job of widening the road. It was then that my wife whispered, "there it is" and I caught a fleeting glimpse of some of the tell-tale yellow on a big boulder at the side of the road. We could not stop then to examine it in view of the whole construction crew. We waited till the noon hour and I then walked back and found the yellow streak on a tremendous boulder blasted from the mountain side of the road. Sure enough the canary yellow dust was streaking all over the side of the boulder in a vein two feet wide. I went back to the car and got a container and a spoon out of the lunch kit. I carefully scraped up some of the yellow dust. Then in my search I came to a hole that seemed to be full of the stuff. I dug in with the spoon and then the light dawned on me. The yellow "dust" was not carnotite but unexploded giant blasting powder that had been spilled out of a drilled hole made for a blast. That was disappointing but it did not discourage me in the least. I just kept on reading books and pamphlets on uranium and I never missed a chance at a professor or mining engineer who had any kind of information. I talked to mining men and curators of museums and with all kinds of prospectors and rock hounds, and all the time I moved from one field to another and picked up loads of samples and loads of information, both good and bad.

If any of you readers want to try your hand at uranium hunting, get the government report (Geological Survey Circular No. 175) on the nearest field which now is being developed in the Black Hills of South Dakota. Or if you want to go farther afield, get Geological Survey Circular No. 176 which covers the Powder River Basin in Wyoming. The Geological Survey also publishes a bulletin known as 988-B which would be helpful to a uranium prospector on the Colorado Plateau. Uranium is also being mined in Montana and Utah, and new finds are being uncovered almost daily in both the United States and Canada.

The Crown Jewels of England

by Dr. J. D. Willems, Staff Member

"Upon Saturday, which was the thirteenth day of January, in the yere of our Lord, 1558, about two of the clocke at afternoon, the moste noble and Christian Princesse, our most dradded Soveraigne Ladye Elizabeth, by the grace of God Queene of Englande . . . passed throughe the citie . . . whereby her loving subjectes maye ground a sure hope for the rest of her gracious doinges hereafter."

That is the way it happened 395 years ago when Elizabeth I was on her way to be crowned Queen of England.

On June 2, 1953, as for a thousand years it has been done, another Sovereign will be crowned with solemn ritual, Elizabeth II., Queen of England. The coronation ceremonies which will occupy approximately the entire day, usually begin with the coronation procession from Buckingham Palace to Westminster Abbey, where the actual coronation will take place. Afterward the State procession will leave Westminster Abbey and return to the palace by a different, and usually much longer route, arriving in the late afternoon.

The coronation ceremonies consist of ancient rites and services to be performed by His Grace, The Lord Archbishop of Canterbury. These begin with the Recognition, the recalling of the far distant time when the Sovereign was presented to his bishops, his nobles, and his people, who then recognized and accepted the Sovereign as their ruler by their acclamations. Next comes the Anointing, symbolizing the spiritual half of the dual character of his kingship. Then follows the Presentation of the Spurs, the Swords, and the Sceptre as symbols of chivalry and justice, equity and mercy, and of sovereign power. Then comes the Enthronization and the actual Coronation, the most dramatic moment, when the Archbishop places the crown on the Queen's head. The people shout, the trumpets sound, and the great guns in the tower are shot off.

Amid this pomp and splendor, hoary with age and dripping with tradition, there are a number of great and beautiful gem stones that play important parts. Their likes have never before been brought together and incorporated into one set of ornaments—the Crown Jewels of England. Diamonds and colored stones of great beauty and enormous size, of remarkable degrees of perfection are set in gold and silver and embellished with miniver, ermine and velvet by the most talented goldsmiths of Europe. They deserve the admiration and study of all who are lovers of the most enduring of all material things—gems.

THE ROYAL CROWNS

There are three crowns for the king, three for the queen, and one for the Prince of Wales. When the Sovereign is a Queen, she presumably wears the King's crowns and her consort wears the Queen's. The present queen does not have a consort, and therefore the Duke of Edinburgh will not wear Royal crowns.

ST. EDWARD'S CROWN

The crown which will be placed upon Queen Elizabeth II on June 2, 1953, is known as St. Edward's Crown. It is the oldest and the most honored. It was fashioned in 1662 for Charles II by Sir Robert Vyner, who patterned it after the ancient crown named for Edward the Confessor, later called St. Edward. This crown weighs almost seven pounds. The young and slender queen will wear this crown only once in her life, for only a few minutes during the actual rite of crowning, after which it will be exchanged for the Imperial State Crown.

St. Edward's Crown carries 16 rosettes on its circlet or band, each

consisting of a center gem stone surrounded by diamonds. The center stones are largely old and honorable diamonds, rubies, emeralds, and sapphires. Above the circlet rise four heavy golden arches, each based upon a cross-patée resting on the circlet. These are adorned with diamonds, rubies, emeralds, sapphires, and pearls. Alternating with the four crosses-patée are four fleurs-de-lis ornamented with rosettes of diamonds and colored gems. At the point of intersection of the arches, which is depressed on the top of the crown to denote Royalty, is placed a golden sphere called a monde, and above this a cross-patée, adorned richly with gems and carrying three large pearls.

The basic structure of this crown is of heavy bands of gold and is therefore heavy and not suitable for wearing on the head for any extensive periods of time.

THE IMPERIAL STATE CROWN

The Imperial State Crown is much lighter than St. Edward's Crown, weighing only 2½ pounds. It is the one which is worn by the Sovereign after the act of crowning has been completed and on later State occasions. This crown was made for the young Queen Victoria by the firm of Rundell & Bridge in 1838. Here are placed many of England's most ancient and honorable gems, as well as some of the world's greatest. It can be said without fear of contradiction, that this crown is the world's finest example of the goldsmith's art and skill, a piece of jewelry indeed fit for a queen.

THE BLACK PRINCE'S RUBY

The Imperial State Crown as a whole is dominated by a large cabochon gem of striking size and brilliant red color —the Black Prince's Ruby. Its history is known since when it came into the possession of the Black Prince, son of Edward III as a gift of gratitude from Don Pedro, King of Castille. It is known to have an oriental history of several centuries before that. The sequence of this venerable gem involves battles, robberies, hideouts, personal combat, dismantling, and the resetting from crown to crown throughout the reigns of 14 British kings and queens.

The Black Prince's Ruby is a so-called balas ruby, or spinel. It is not a corundum. Its color is that "of human blood." The size is that of a small hen's-egg, about two inches in length, but its exact weight has never been determined, because of the fact that it is set in an ancient gold backing which no jeweler or stone setter has dared to remove for fear of damaging the stone. The shape of the gem is somewhat irregular and most likely represents roughly its original contours. No other ruby of comparable size or beauty has ever been known to exist in the Western world.

This great ruby has occupied the central, honored place in the front of the crown for several generations of sovereigns. It is set in the cross-patée just above the great diamond in the circlet.

THE STAR OF AFRICA II

The place of second honor in the Imperial State Crown is held by a large and gorgeous diamond—the Star of Africa II. It is, so far as known, the second largest cut diamond in existence. This beautiful gem is set in the circlet of the crown, in front, just

→

Pictures show: Left—St. Edward's Crown. The Crown, copied in the time of King Charles II from the ancient Crown worn by Edward the Confessor, is the Crown of England. Most Monarchs of England have been crowned with it since it was made. Right—the Imperial State Crown. This Crown is worn by the reigning Monarch on all State occasions. Made in 1838, it embodies many historical gems—the Black Prince's ruby, and a sapphire from the ring of Edward the Confessor. In front is the second Star of Africa, weighing 309 carats, cut from the great Cullinan Diamond. In all, the Crown contains 2,784 diamonds, 281 pearls, 18 sapphires, 11 emeralds and five rubies.

Photo supplied by British Information Service

below the Black Prince's Ruby, where it occupies a place of honor second only to the ruby. It forms a fitting "buckle" on the band of clusters of gems, each having a large sapphire or an emerald in the center surrounded by diamonds.

The size of the Star of Africa II is 1.77 inches by 1.59 inches, and its weight is 309-3/16ths carats. The shape is a square brilliant, or a so-called cushion, cut. It is oblong with rounded corners and slightly curved sides. It is of the finest quality and color, being without imperfections of any kind.

The Star of Africa II is a part of the great Cullinan diamond.

THE STUART SAPPHIRE

The third great gem in the Imperial State Crown is the famous Stuart Sapphire. It is set exactly opposite (not shown in the picture) to the Star of Africa II, at the back of the circlet. This gem is said to be the property of Charles II, and was passed on to succeeding Sovereigns until it reached Queen Victoria. It was placed in the crown made for her in the position of honor, the same position now occupied by the Star of Africa II.

The Stuart Sapphire is about 1½ by 1 inches in size, elliptical in shape and though it has one or two imperfections and is thin, it has an exceptionally fine color.

THE SAPPHIRE OF ST. EDWARD

Another fine sapphire in the Imperial State Crown is placed in the large cross-patée at the top. It is a stone of excellent color and brilliancy. This gem was once in the coronation ring of Edward the Confessor, dating back to 1042, before the Norman Conquest. It has, therefore, a history and tradition that can scarcely be matched by any other object in English history. Magic powers have been ascribed to it, which doubtless was of benefit to some of the earlier Sovereigns who possessed it.

THE PEARLS OF ELIZABETH I

From the four corners formed by the four arches of the Imperial State Crown are suspended four great pear-shaped pearls. These, according to tradition, were once the earrings of Queen Elizabeth I. They are of excellent quality, great beauty, and symmetry. They are approximately the same in size, which is said to be that of a small bird's-egg.

These pearls are unusual in that they ornamented a great queen. They were the private property of Queen Elizabeth I and as such she could wear them at her discretion and desire. There were no traditional functions nor restrictions. This great queen loved pearls and she had many, wearing them on every suitable occasion, as shown by many old steel engravings.

Pearls are said to deteriorate unless worn more or less constantly next to the skin. These four large pearls are of such shape and size as to be unsuitable for wearing in a necklace or bracelet. They required a pendant position, such as earrings.

Be it said that these four pearls have retained their beauty for nearly 400 years and promise to continue in that state indefinitely. What wonderful stories they hold locked within them!!

THE LESSER GEMS OF THE IMPERIAL STATE CROWN

In addition to the five great gems in this crown described above there are many lesser ones, some with individual histories and legends. There is in this crown a total of five rubies, eleven emeralds, 18 sapphires, 281 pearls, and 2784 diamonds. The crown is so made, and the gems so artfully distributed and set that almost nowhere is the metal framework visible. It presents a mass of fire, sparkle and color fit indeed for a great queen.

It is presumed that certain alterations are now in progress to make the Imperial State Crown to fit the new Sovereign and suitable for wear at

Imperial Crown of India

Crown of Queen Mary, Consort of King George V

Crown of Mary of Modena, Consort of King James II

Crown of the Prince of Wales

State occasions. While no hint has come of what these alterations involve, it can nevertheless be said that the outstanding firm of goldsmiths to undertake such a job is Garrard's, Crown Jewellers and Goldsmiths to six reigns during three centuries.

THE IMPERIAL CROWN OF INDIA

The Imperial Crown of India has the unusual distinction of being produced for one particular occasion, the crowning of King George V as Emperor of India. It is finely designed and in the more modern style with the arches sloping up toward the monde, or sphere, where they turn back in a reverse curve. This form is indicative of imperial status, as compared to the dipping arches of royal status.

There are many beautiful emeralds and sapphires, all encrusted with diamonds in this beautiful crown. The gems are all of more or less modern origin. This crown is the work of Garrard's in 1912, and it contains 6000 gem stones.

THE QUEEN'S CROWNS

For the queens of England, who are the consorts of their Kings, there are three crowns. Since in the coming coronation there will be no consort of the queen, these crowns will receive relatively little attention.

The crown of Mary of Modena, consort of James II is a small crown, made to be worn on top of the head, not to fit around it. It contains only diamonds and pearls, around the circlet or band, as well as over the two arches. In the depressed part of these arches where they meet on top of the crown, a monde rests, and above it a cross-patée.

The diadem of the same queen was made for the purpose of convenience, it being lighter and therefore easy to carry about. It is a diadem because it has no arches, only the circlet and the velvet cap above it. Diamonds and pearls adorn the band.

THE STATE CROWN OF QUEEN MARY, CONSORT OF KING GEORGE V

It has been said that this is the most gracefully beautiful crown ever designed. It is unusual in other respects as well. This crown was the private property of Queen Mary, (the grand and stately Lady who just died the day before this was written); the crown is exclusively a diamond crown.

This crown carries three large and important diamonds, which were not the queen's property but belong to the State. These three stones are significant as well as beautiful, and they bring together the ancient and the modern in an unusually harmonious whole.

THE KOH-I-NUR DIAMOND

This gem is of great antiquity. It originated in India, exactly how long ago no one knows. Its history is a matter of record since 1304. It passed through many hands in the East by wars, invasions, assassinations, theft and succession, but eventually in 1850 was presented to Queen Victoria. In its original form it weighed 191 carats. The queen commissioned Garrard's to re-cut the stone into a shallow modern brilliant, after which it weighed 108.9 carats. It did not turn out that this was the perfect cut for this gem, although it did gain some brilliance and fire. However, at the same time it lost much of its historical interest, since the entire shape of the stone was altered. The recutting of this great diamond took place in 1852. The Duke of Wellington was invited to put on the first facet.

The Koh-i-Nur is seen in Queen Mary's crown, set in the large cross-patée in the front just above the circlet. It is round and contains the 58 facets of the standard brilliant cut.

THE STAR OF AFRICA III

In the cross-patée at the top of Queen Mary's crown is a diamond of great beauty of form, size, clarity, perfection, color, fire and brilliance, the Star of Africa III. It is the number three gem cut from the great Cullinan. It has a pendeloque shape and is mounted with the point downward. When the rays of light fall upon the surface of its table from certain directions the back of this remarkable stone will reveal the outlines of a cross. It weighs 92 carats.

THE STAR OF AFRICA IV

The remaining important gem stone in Queen Mary's crown is the number four gem cut from the original Cullinan. It is a "square brilliant" of the same excellent quality as the other Cullinan stones. It is roughly square with rounded corners and very slightly curved sides, so as to make it possible to cut the arrangements of facets necessary for the brilliant style.

This gem is mounted at the front of the circlet in the place of honor just

below the great Koh-i-Nur. Its weight is 62 carats.

THE PRINCE OF WALES' CROWN

This crown, as it properly should be, is the least pretentious of the royal crowns. It is made of gold and is embellished with golden representations of gem stones, but is completely devoid of any real gems. It carries a single arch with the orb and cross-patée. This simple dignified crown is used when the King indicates his choice for the little Prince of Wales. This prerogative has not been used extensively by the Sovereigns except to show preference for the eldest son.

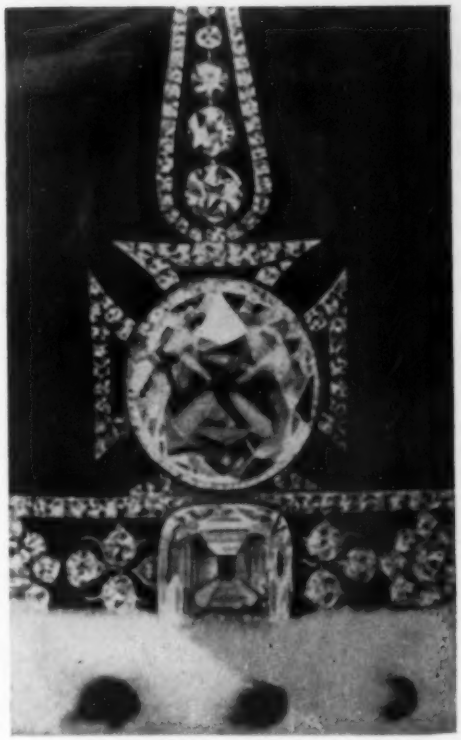
THE ROYAL SCEPTRES

There are two sceptres of great importance, only second to the crowns. These are the King's Royal Sceptre with the Cross, and the King's Sceptre with the Dove. Both of these play a part in the ceremony of crowning, when they are placed into the Sovereign's hands just before the crown is placed upon the Sovereign's head by the Archbishop. The sceptre is emblematic of the Sovereign's power and a mark of her authority.

There are also three sceptres for the queen, the consort of the king. These are not expected to enter the ceremonies of the coronation since there is no consort.

THE ROYAL SCEPTRE WITH THE CROSS

This is a rod of gold about three feet long. It was originally made for Charles II and remained largely unchanged until King George V decided that the Star of Africa I, the largest cut diamond in the world, should be set into the head of the King's Sceptre with the Cross without removing anything that was already in the sceptre. This difficult problem was solved by Garrad's in such an artful manner that the sceptre is now one of the most beautiful of all the crown jewels. It contains three important gems, one of



Center — Koh-i-Nur Diamond
Bottom — Star of Africa IV

which is the largest known diamond in existence.

THE STAR OF AFRICA I

This gem, the number one stone cut from the great Cullinan diamond, is a gem of great beauty, perfect cut, and devoid of imperfections. All other known diamonds fade into unimportance and insignificance when compared with this mountain of light and fire.

The Star of Africa I was cut from the Cullinan diamond by I. J. Asscher and Company of Amsterdam in 1908. The stone had been found to have a flaw near its center and a few glessen or grain marks near the periphery where they could be eliminated in the process of cutting. After long study the actual work of cutting began. Mr. Asscher cut the groove for cleaving the stone so the cleavage would pass through the flaw in the center. Thus

would be eliminated the one important flaw from both of the resulting parts. On the appointed day he placed the cleaving blade into the groove and struck the blow. No cleavage resulted, but the blade had been broken. A new blade was brought and the second blow split the great stone exactly through the flaw, leaving a thin frosty mark on each surface which would be easy to eliminate in the cutting.

The larger portion was then cut into a large pear-shaped gem with 74 facets in the brilliant style. The final weight after cutting was 530.2 carats. The size of the finished gem is 2⅛ inches by 1⅛ inches. This was named by King George V, The Star of Africa, and to distinguish it from the other three portions cut from the same great rough diamond, the I was added.

This large diamond made it necessary to produce special tools for the cutting operations. A special mill 16½ inches in diameter was designed, and the running speed of the skeif was 2400 revolutions per minute. Mr. Anri Koe of the Asscher firm did the actual cutting, which took from January 23, 1908, to September 12, 1908.

The great Cullinan diamond was found more or less accidently by mine Captain Frederick Wells, who, on his way out of the Premier mine in South Africa, in the late afternoon saw a flash of light in the side of the mine wall. He then and there dug out the greatest diamond ever found, the Cullinan, weighing 3106 carats (1⅓ pounds). This was in January 1905. In November 1907 the People of Transvaal, where the Premier mine is located, purchased the Cullinan from its owners and presented it to King Edward VII as a birthday gift. This was rather a remarkable turn of events when it is recalled that the people of South Africa had just recently emerged from the Boer war in which they had lost their freedom to the British. By their act they demonstrated their intentions.

There are two additional gems of importance in the King's Royal Sceptre. Above the Star of Africa I in the head of the sceptre rests the great amethyst orb. It is faceted all over and encircled by golden bands, set with rubies and diamonds. A large and lovely emerald occupies the center of the cross-patée above the amethyst.

The King's Sceptre with the Dove and three Sceptres of the Queen are Crown Jewels in full keeping with the rest but they contain no gem stones as great as the ones that have already been described.

THE ROYAL ORBS

There are two golden orbs, one for the King and one for the Queen. The orb with Cross is an ancient Christian emblem which denotes the control of the Christian religion over the earth, the spiritual above the mundane.

The King's Orb, or Monde, is a sphere of gold six inches in diameter. It is placed in the right hand of the Sovereign during the ceremony of coronation. The sphere is circled by a band around the center, outlined with pearls and set with clusters of gems. An arch passes over the top of the orb, carrying similar clusters of gems. At the top of the arch is set a fine amethyst of remarkable size (1½ inches in height) and of excellent color. It is faceted all over and placed with the culet upward while the table rests upon the arch above the orb. Above the amethyst rises a beautifully executed cross-patée, considered the most attractive of all the crosses of the Crown jewels. In the center of the cross is a fine emerald on one side and an equally fine sapphire on the other side.

The Queen's Orb is a near replica of the King's Orb, but it is smaller and carries no outstanding gems.

THE LESSER REGALIA

There are numerous additional objects that play important parts and traditional roles in the coronation ceremonies, but none where gem stones occupy large areas of the stage. Among these are:

St. Edward's Staff, or the Rod of Justice and Equity, to guide the Sov-

(*Concluded on page* 23)

The Basic Lapidary Processes

Grinding - Second of a Series

by Wm. J. Bingham

This article, the second of the series of four, will cover the grinding process for lapidaries.

Many persons forget that grinding, as well as all other lapidary procedures (except some kinds of polishing) are *subtractive* processes. In other words they are methods of *removing* material. If too much is removed there is no way to build up the stone again. Since care must be taken not to remove more than the desired amount it is important that the process provide good control. The grinding process by its very nature does not provide as good a control as do the smoothing processes (to be covered in the next article) and therefore should be used for *roughing only*. Grinding is the fastest process for removing material except sawing. One very important thing to remember about *all* lapidary processes is that they should be conducted *wet* and not dry. Stone dust from a dry operation is injurious to the lungs, sometimes very injurious.

The grinding operation can use either loose abrasives on a lap wheel or plate, or the abrasive grains may be bonded together in the form of a wheel. The modern grinding wheel is superior to loose abrasives in speed, convenience, control and cleanliness. Loose abrasives will not be discussed further here.

The action of abrasives on stones and minerals is different from their action on metals, in that stones are very hard and brittle and the abrasives produce *scratches* thereon and not shavings as with metals, etc. The sharp corner of an abrasive grain dragging across the surface of a stone, crushes the material directly underneath it and in compressing the crushed material it pushes flakes off the sides of the groove thus formed. If the abrasive grain making the scratch has a very sharp corner it flakes off material with almost no production of heat, while if it has a broad rounded corner (giving a considerable area in contact with the stone) there is a lot of friction and heat is developed. It is therefore necessary to get rid of the abrasive grains as fast as they get worn or dull. This is determined by the type and amount of bonding material used in the wheel.

The materials used to hold the abrasive grains together to form wheels are called bonds and are of many varieties. For lapidary work the vitrified, phenolic resin and metallic bonds are the ones commonly used. The hardness (ability to hold the abrasive grains is place) of wheels can be varied by using different proportions and different materials in the bonds. For ordinary lapidary work on agate, jasper, petrified wood, jade, etc., I would recommend a Norton wheel —37C80-KV or the equivalent of other makes. If a predominant amount of grinding is to be done on harder materials a wheel of somewhat softer bond would be better and also a harder bond would be used if the grinding was predominantly on soft stones (under 5 in hardness). For lapidary use on stones of 5 in hardness (Mohs scale) or over, the only abrasives that are satisfactory are silicon carbide and diamonds. Other abrasives may be satisfactory on softer stones.

It is very important not to exceed the safe speed recommended by the manufacturer and usually printed on the label on the wheel. It is better to run the wheel at ⅔ to ¾ of this speed. Higher than recommended speeds may cause the wheel to break and the flying pieces could do a lot of damage. Too slow a speed tends to encourage the development of bumps. A ten inch wheel of the above listed make should run about 1900 to 2000 R.P.M.

If a wheel gets bumpy or grooved, it should be trued up with a diamond truing tool (the best way) or by using a chunk of old very coarse grinding wheel. The diamond tool should be heavy

enough so it will not follow the bumps or irregularities in the wheel and should be supported on a rest and used just like a chisel on a wood turning lathe except that the cuts are *very light*. If the wheel becomes "glazed" (when the grains get rounded off so as to present no sharp corners for scratching) it should be roughened with a "star wheel dresser," which is a group of star shaped, very hard steel wheels, mounted in a handle so they can rotate freely. This tool is presented to the wheel like the diamond truing tool mentioned above, and the rotating star points knock out small pieces of the grinding wheel and expose fresh sharp grains. It should be used sparingly as it wears away the wheel at a rapid rate.

The grinding machine is very simple, consisting of a shaft, grinding wheel, smoothing wheel, pulley, bearings, water supply and control and splash pans for containing the water spray. The usual arrangement is shown on the accompanying sketch. The machine should be well anchored to hold it in place as it will vibrate and "travel" if everything isn't in very good balance. The shaft should be made of "drill rod" with the ends threaded and of the sizes shown in the adjacent table. This is made from a very strong steel, ground accurately to size and very straight; and will fit the inch sized, self aligning ball bearing pillow blocks. The water supply system consists of a pail suspended by a cord from an oversized violin peg so it can be readily raised or lowered. The bottom of the pail and the bottom of the pan are connected by a hose. By raising or lowering the pail, the water level in the pan can be changed. For grinding, the water level in the pan should be such that it just touches the wheel. When not in use, the pail is lowered a little, thus lowering the water level in the pan so that it will not touch the wheel when it isn't rotating. If the water is in contact with the wheel when it isn't rotating it will soak up one side and cause it to be very much unbalanced.

Wheel Diameter	*Recommended Shaft Diameter*
6"	½"
8"	⅝"
10"	¾"
12"	1"

The actual grinding operation is quite simple—the stone is firmly held in the hands and pressed against the revolving wheel! A few precautions are necessary for satisfactory results: Hold the stone steady—don't let it bounce. Keep the stone moving, both to equalize the wear on the wheel and prevent forming grooves (the wheel face should be straight and at right angles to the side of the wheel) and/or overheating one spot on the stone which may cause it to crack. Grinding across a corner or sharp edge may produce undesirable chipping or flaking of the stone. Where grinding is done on a surface that is to be later smoothed and polished, it is very desirable to have all the rough grinding scratches approximately parallel over the entire surface. The reason for this will become apparent in the coming article on smoothing.

It should be remembered that grinding is a *roughing* operation and it is impractical to try to do a finishing job on a grinding wheel.

(*See diagram on opp. page*)

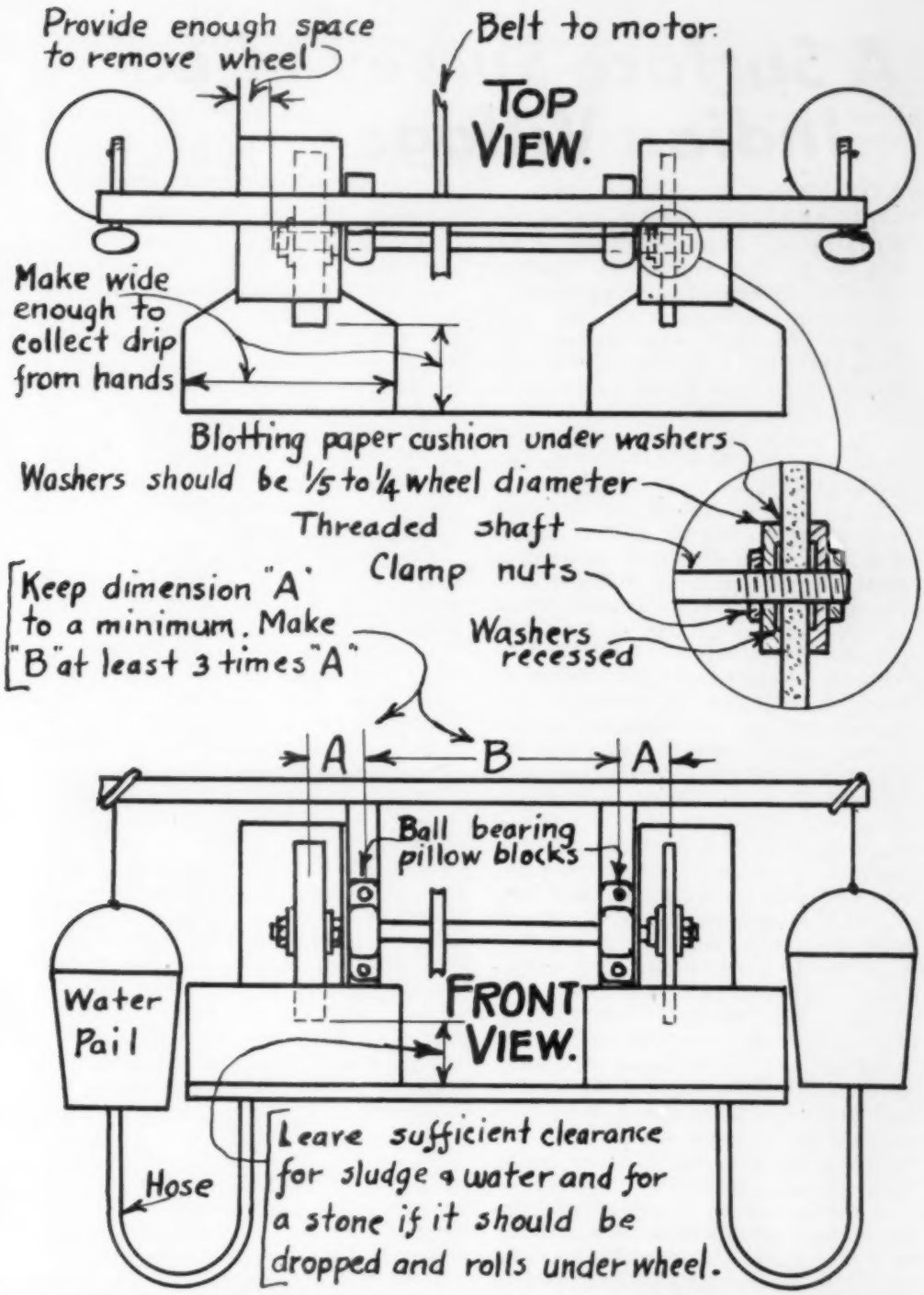
* * * * *

THE QUESTION BOX

How do you saw Quartz, precious topaz, tourmaline?

Albert W. Ballentine
Upper Montclair, N. J.

Answer: Quartz, topaz, and tourmaline can be sawn just the same as any other mineral or stone. They can be sawn in any direction desired in relation to the crystal axes. The direction will depend only on the shape of the rough and the shape and size of the finished piece desired. To save valuable material, use a thin saw blade and for these minerals a somewhat lighter pressure than recommended for agate.



LAPIDARY GRINDING WHEEL ARRANGEMENT.

Wm. J. Bingham -1953.

A Surface Survey of an Indian Village

by Dave Wenner
1005 W. Cossit St., La Grange, Ill.

The September, 1952, issue of the *Earth Science Digest* contained an article about the Archaeology Interest Group in ESCONI. Something was said concerning the general aims and methods to be used by the organization. Since that time these amateur archaeologists have been actively engaged in trying to fulfill this program.

This article will use a recently found prehistoric Indian village to illustrate the methods used by the group and to indicate what knowledge can be gained from a surface survey of this sort. It should be noted that our information deals only with material collected from the surface and that excavations would probably change or add to the interpretation given here.

The site was found by a member of the club while on an outing to the Kankakee River in Kankakee County, Illinois. Numerous flint spalls were the first indication of an occupation area. Careful inspection of the surface produced fragments of pottery, mussel shells and animal bone. Since this first discovery, numerous trips, including two field trips by the group, have been made. The following description and discussion of the site was the result of work by the entire group, their collections, photographs and field notes.

The village itself, as indicated by surface material, covers an area several acres in size. The principal occupation areas seem to lie parallel to the Kankakee River on the timbered slope of a sand knoll. It is not shown if all the area was occupied by the same group or at the same time.

A surface survey can yield much information that cannot be brought home in a paper sack. Written field notes and photographs are valuable additions to the actual collections. For example, a road cut bisected the site, providing a clear profile. The embankment was cleaned off, and the profile showed clearly the depth of the site along this point. The dark occupation area containing charcoal, bone, flint chips, sherds, burnt clay, etc. contrasted sharply with the light colored subsoil. Numerous cache pits (storage pits often later used as trash pits) were observed cutting through the occupation area and extending below into the subsoil. We found the site to be several feet in depth at several points. The average depth was about two feet. This type of evidence is often exposed but overlooked by the surface hunter.

The group found several types of stone artifacts, of which projectile points and scrapers were the most numerous. The scrapers consisted of flint spalls with fine secondary chipping along the edges or the ends, sometimes along both edges and ends. Several thin, ovoid scrapers were found with both faces worked. The projectile points can be divided into three classes. There were large, thick, percussion flaked, stemmed and notched points. The second class included small, thin, triangular points (often called "bird points") with fine percussion flaking over all areas. A third class included small to medium notched points, well worked and pressure flaked over the entire surface.

The collections included hammerstones made of chert nodules and showing wear on the end surfaces. Only one hammerstone was entirely shaped by pecking, and each face had pitted depressions.

Bone or shell artifacts have not been found, but fragments of mussel shell and bone are very abundant. Several small fragments of worked bone were collected. Bone fragments are saved to identify the animals used by the occupants of the village. Deer bones are the only ones definitely identified at the present date.

Flint spalls are often overlooked, but

it is a good plan to collect them. They often give clues concerning the sources of material used in manufacture of stone artifacts. They give an idea of the range of contact or extent of trade had by the occupants of the site. A study of this nature is needed, but has not been undertaken for the Kankakee village.

The archaeologist has found pottery to be the most useful artifact for relating and dating sites, since it is usually plentiful and durable, and it is susceptible to change in styles through time or from contacts from outside groups.

The most numerous artifacts at the site were pottery sherds. A total of more than three hundred sherds have been found to date. Those most frequently encountered (90%) came from globular shaped vessels with short rims, flaring out at an angle from the shoulder or gradually curved out. The lips of the rims were flattened and rectangular in cross section. These brown to grey sherds were fairly thin and tempered with a black grit material. The surfaces were smooth and only a few sherds were decorated. The decoration, when present, consisted of broad, shallow, trailed lines on the exterior surfaces. The exteriors of a few sherds were cord-marked, that is, the surface was treated with a cord-wrapped paddle before firing.

The Pot in Situ

A very small group of sherds differs from these, and for that fact, is of special significance. A vertical rim sherd was found having a thickened rim, triangular in cross-section, and grit tempered. The interior surface was decorated just below the lip with a row of diagonal notches that have been partly smoothed over. The sherd differs in other characteristics from the majority of sherds found.

The outstanding find was that of the third or more of a large, open mouthed jar exposed in the side of the road embankment. The road grader had destroyed and removed the lower portions of the vessel. The pot was uncovered carefully with trowel and brush, left in place and photographed. Careful notes were made of its depth and position before it was removed. The vessel has been partly reconstructed and indicates a jar of about 40 cm. (15.8 in.) in height and 28 cm. (11 in.) in diameter at the base of the wide flaring rim. The lip is rounded and smooth. The area below the shoulder has a fine vertical cordmarking, while above the shoulder it is smooth and decorated. A notched strip of clay was added just below and paralleling the lip. The entire rim and shoulder area has a series of connecting chevrons, producing a banded zigzag pattern around the vessel. The design is made by broad and shallow trailing. Broad strap handles extended from the lip to the base of the shoulder. Not enough of the handles remained to show whether they were in the form of an X or were parallel double handles. The temper is shell in contrast to the grit tempering in the other sherds found.

This vessel was shown to archaeologists of the Chicago Museum of Natural History, the Carnegie Museum of Pittsburgh, and the University of Michigan. The splendid cooperation received from a number of these people indicates they are interested in amateur groups such

as ours and in the work we are doing.

We may ask, "How old is the material found?" and "Do all the artifacts be'ong to the same culture?" The answers lie in scientific excavation and comparative study of the cultural complexes and sequences in the surrounding area.

A few tentative statements can be made about the site and its artifacts based primarily on our knowledge of the archaeology of the surrounding areas. The immediate area has received little or no scientific investigation.

The depth of the site and other factors indicate a rather concentrated and perhaps long single occupation or a series of occupations. The variation in projectile points found at the Kankakee village may indicate a considerable time span in the occupation of the site. The large percussion flaked projectile points are generally associated only with the early archaeological periods in Illinois, whereas the other described points are generally associated with later prehistoric cultures. This is particularly true of the "bird points" that continue to the historical contact period.

The bulk of the pottery found is typical of the late prehistoric periods in the Northern Illinois River Valley. Sites containing this pottery extend roughly from Starved Rock State Park to sites within the city limits of Chicago. Similar pottery has been found in northern Indiana and southwestern Michigan.

The shell tempered jar, described above, is unique in that it is very different in shape, surface treatment, temper, large size and decoration. It is very similar to pottery of a late prehistoric culture found centering in the region of the southern Ohio and adjacent areas. Pottery from this culture has been found at only one other place in Illinois, and that was by the University of Chicago in the Starved Rock State Park area. This vessel is similar in many respects to the Starved Rock material, but differs in some characteristics. Whether we have a trade pot, decorative influence from outside areas, or the arrival of a new cultural complex at the site we cannot say until the site is studied more intensively.

Closeup of Lip of the Pot

The ESCONI group plans to do more work at this site and to try to get research institutions interested in excavation of the site. We are looking forward to finding and studying more sites and fitting the data together to give us an insight into the various prehistoric cultures of our area.

* * *

— SUBSCRIBE TO THE E. S. D —

STOP and see MONTANA'S LARGEST DISPLAY of minerals, rocks, fossils and fluorescents. We have large supplies of

Montana Agates and Agatized Woods

as well as a large dark room and a full line of

Mineralights

Stop and see our "BRAGGIN" rocks.

No Mail orders, please, unless you are registered in our guest log.

YELLOWSTONE AGATE SHOP

Chas. and Connie Miller • Livingston, Montana

Our shop is located on the south edge of Livingston, on Highway 89, the Yellowstone Park Road

CROWN JEWELS (*From p.* 16)

ereign's footsteps in the path of righteousness;

The Ampulla, which contains the holy oil for anointing;

The Anointing Spoon, for the anointing rite;

The Sword of State, which is borne before the Sovereign at the opening of parliament;

The Jewelled Sword of King George IV;

The Sword of Mercy, named Curtana, with its broken blade to signify mercy;

The Sword of Spiritual Justice;

The Sword of Temporal Justice;

The Coronation Ring, with which the Sovereign is wedded to the State;

The King's Golden Spurs, or St. George's Spurs, which are symbols of knightly chivalry;

The King's Bracelets, which are the most ancient emblems of royalty; and

The Great Salt Cellar of Queen Elizabeth I, which was used with others to mark the difference in rank of the guests at table.

With these jewels, and others not mentioned, the new Sovereign of the British Empire will come before her people and ascend her Throne. The jewels have endured and will continue to do so. They have been the delight of the rulers and the people and will again parade their unequalled beauty, to do so again and again in the future. These royal members of the mineral kingdom do not fade, nor wilt nor ever change; they will last till the end of time. That it as it should be.

All photos by courtesy of Cassell & Company, Ltd., London, from their book, The Crown Jewels of England, by Younghusband & Davenport, except as noted.

COVER PHOTO—Head of the King's Royal Sceptre with The Cross, fully described on pages 15 and 16. Also by courtesy of Cassell & Company, Ltd., as noted above.

Dr. John R. Ball

The Midwest Federation and the geological fraternity at large suffered a distinct loss in the passing of Dr. John R. Ball, former professor of Geology and Paleontology at Northwestern University, on Sunday, March 1st, in Seattle, Washington, following an illness of many months.

He was always generous of his time and ability, and helpful in many activities of the Clubs and the Midwest Federation, while among us. He was docent lecturer of the Marquette Geologists Association, and Honorary President of the Minerolorist Society of Joliet for many years, and was always on hand to advise when council was needed, or for a talk on one of the numerous field trips held throughout the Chicago area, or perhaps to pinch hit for a lecture before the Societies.

Following his retirement from Northwestern in 1946, he taught at the University of Kansas City, where he became faculty sponsor for the Heart of America Geological Society of that city. He also taught at the University of North Carolina before removing to Washington in 1951, where he served for a time on the faculty of the College of Puget Sound, at Tacoma.

Dr. Ball was born in Fremont, Ohio, in 1882. He attended the College of Puget Sound and was graduated from Northwestern University in 1913. He received his master's degree in 1917 and his doctor's degree from the University of Chicago in 1927. He was a leading writer in his field and had published a number of books and articles.

Dr. Ball was a fellow of the Geological Society of America and the American Paleontological Society. He was a member of the American Association of Petroleum Geologists, the Society of Economic Paleontologists and Mineralogists, the Illinois Academy of Science, the Chicago Academy of Science and Sigma Xi (honorary scientific and technical fraternity).

Strike it Rich!

Find Strategic Minerals, Hidden Wealth with ULTRA-VIOLET MINERALIGHT!

MINERALIGHT instantly locates, identifies vital minerals, saves hours of fruitless search.

Invaluable for prospectors, miners, engineers and hobbyists, MINERALIGHT helps you find tungsten, uranium, mercury, zirconium and many other minerals now being sought for use in vital preparedness work.

Ultra-Violet Fluorescence Study Is an Interesting and Pleasant Hobby!

Even though you may not be interested professionally, you'll still find a great deal of fun and happiness when you make ultra-violet study and mineral sample collection your hobby. Ultra-Violet MINERALIGHT opens up new, strange worlds . . . gorgeous colors and reactions you never knew existed. Make this exciting hobby *your* hobby!

Learn to Recognize Valuable Minerals

When you use Ultra-Violet's MINERALIGHT, you want to be able to recognize the patterns and colors that samples fluoresce. Mineral sets, packaged in varied assortments of the various minerals you will encounter, are valuable aids. Ultra-Violet MINERALIGHT rays show them in all their exciting colors . . . permit you to recognize what you find in the field. Mineral sets, carefully packaged in foam plastic, are available at only $2.50 per set of 10 specimens.

See MINERALIGHT in Action! *Your Dealer Has It!*

Here is a partial list of the more than 500 Ultra-Violet MINERALIGHT dealers ready to serve you...coast to coast

ALASKA
Mineral Equip. Sales & Research
Box 1442, Fairbanks

ARIZONA
Gritzner's Minerals
135 N. Sirrine St., Mesa
Kane Lapidary & Supply
2813 N. 16th St., Phoenix
Pratt-Gilbert Hardware Co.
701 S. 7th St., Phoenix
Sam'l Hill Hardware Co.
142 S. Montezuma St., Prescott
Randolph Oak Creek Canyon Mineral Shop, Sedona
Mission Curio Mart
4400 Mission Road, Tucson
Hazel E. Wright
30 Cochise Row, Warren

ARKANSAS
House of Hobbies, Rt. 4
Hot Springs Nat'l. Park

CALIFORNIA

Berkeley
Minerals Unlimited
1724 University Ave.

Big Pine
Bedell's Mercantile
118 N. Main St.

Bishop
Bishop Hardware & Sup. Co.
336 N. Main St.

Buena Park
Ghost Town Rock & Book Shop
Knott's Berry Farm

Canoga Park
Warren C. Bieber
7229 Remmet Ave.

Castro Valley
The Sterling Shop.
8679 Castro Valley Blvd.

Chico
Golden Empire Mineral Shop
P.O. Box 906

Compton
Compton Rock Shop
1409 S. Long Beach Blvd.

Fresno
Pacific Mill & Mine Sup. Co.
530 Van Ness Ave.

Glendale
Pascoes
1414 W. Glenoaks

Hollywood
Engineers Syndicate, Ltd.
5011 Hollywood Blvd.
A. V. Herr Laboratory
5176 Hollywood Blvd.
Shannon Luminous Materials Co.
7356 Sta. Monica Blvd.

Lodi
Armstrong's
Rt. 2, Box 516

Long Beach
Elliott Gem & Mineral Shop
235 E. Seaside Blvd.
Gordon's Gem & Mineral Supplies
1850 E. Pac. Coast Hwy.
Mohave Sales, Inc.
1768 Atlantic Ave.

Los Angeles
Black Light Corp. of Los Angeles
5403 Santa Monica Blvd.
The Bradleys
4639 Crenshaw Blvd.
Jasper Junction Lapidary
1112 Neola St.
J. J. Jewelcraft
2732 Colorado Blvd.
Mine & Mill Machinery Co.
310 E. 3rd St.
Stratex Instrument Co.
1861 Hillhurst Ave.

Napa
Brandt's Rock & Gem Shop
1034-A Sonoma Hiway

Needles
McShan's Gem Shop
Highway 66

North Hollywood
Modern Science Laboratories
8049 St. Clair Ave.

Orange Cove
Wm. M. Clingan, Clingan's Jct.
Highway 180

Palo Alto
Fisher Research Labor., Inc.
1961 University Ave.

Pasadena
Grieger's
1633 E. Walnut St.

Paso Robles
Coast Counties Pump & Elec. Co.
1240½ Park St.

Placerville
Enterprises Unlimited
Rt. 3, Box 143

Randsburg & Ridgecrest
W. A. Hankammer

Redlands
Covington Lapidary Engineering
1st & Hiway 99

Reedley
Tyler Jack
Hare's Pharmacy

Riverside
Hurrle's Gem Shop
3825 7th St.

Sacramento
MacClanahan & Son
3461 2nd Ave.
Ivan Ogden
520 56th St.

San Bernardino
Greenwood's
455 Third St.

San Carlos
Lloyd Underwood,
1027 E. San Carlos Ave.

San Diego
Gem Arts, 4286 Marlborough
Plummer's Minerals
4720 Point Loma Ave.
Superior Gems & Minerals
4665 Park Blvd.
Warren's Minerals
2154 Bacon St.

San Francisco
Leo Kaufmann
709 Harrison St.

San Gabriel
Rainbow Gem Company
546 W. Mission Dr.

Soquel
Thompson's Mineral Studio
P.O. Box 124

South Pasadena
Dunham Economy Concentrator Co.
853 Mission St.

COLORADO
The Gem Exchange
Gem Village, Bayfield
City Curio Shop
P.O. Box 433, Cripple Creek
Denver Equipment Co.
1400 17th St., Denver
Riley's Reproduction
1540 Glenarm Place, Denver
Shelden's Minerals Agency
307 14th St., Denver
Eckert Mineral Research
112 E. Main St., Florence
Palmer's Lapidary & Fixit Shop
1503 N. College, Ft. Collins
Bernstein Brothers
164 N. Mechanic St., Pueblo

D. C.—Washington
Gem Lapidary
2006 Florida Ave. N.W., Washington, D.C.

FLORIDA
Rock & Shell Shop
215 Alhambra Cir., Coral Gables

GEORGIA
Owen Hoffman
N. Alexander Ave., Washington

IDAHO
The Sawtooth Company
1115 Grove St., Boise
S. V. Higley
1718 Albion Ave., Burley

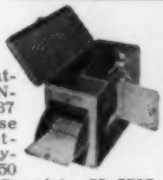
ILLINOIS
Tom Roberts Rock Shop
1006 S. Michigan Ave., Chicago
Ret R. Latta Lapidary Equip.
254 Pearl Ave., Loves Park

KENTUCKY
Ben E. Clement
Marion
Ancient Buried City
Wickliffe

MINERALIGHT SL-2537

All purpose lamp, operates on 110V AC, weighs only 1 lb. $39.50

FIELD CASE No. 404



Contains special battery circuit for MINERALIGHT SL-2537 or SL-3660. Case holds lamp, batteries, built-in daylight viewer. $19.50 (Plus Bats. $4.50) Complete: SL-2537, 404 CASE, BATS. $63.50.

MODEL M-12

Completely self-contained, battery operated, weighs only 3¼ lbs. $34.50 plus battery (80c)

MODEL TH

Has bulb rated at 1000-2000 hours of use with 90-day guarantee. Includes a transformer with switch for continuous high efficiency. Price $17.50. Model H is similar, same bulb, except has resistance cord instead of transformer. Approximately ½ the intensity of the TH. $12.50

MODEL SL-3660—LONG WAVE

110V AC unit. (Can be used as a portable unit for field work in conjunction with Carrying Case Nos. 303, 404, or 505.) Weight 1 lb. $29.50

DISPLAY & EXHIBIT UNIT MODEL XX-15 LONG WAVE

A high quality 110V AC lamp giving excellent intensity and coverage for mineral sample exhibits and displays. Price $25.75. Other multiple - tube models available.

Some materials fluoresce to short wave lengths and some to long wave lengths. Others will react to both wave lengths but with different color responses. Although practically all commercially important minerals (the ones that have real monetary value) are activated by short wave, many collectors specialize in the more unusual long wave minerals.

LOUISIANA
Riley's
423 Crockett St., Shreveport

MASSACHUSETTS
Schortmann's Minerals
6 McKinley Ave., Easthampton

Quabbin Book House
Ware

MICHIGAN
Int'l. Stamp Bureau
125 W. Adams Ave., Detroit

MINNESOTA
Nokomis Lapidary & Watch Shop
3840 26th Ave. So., Minneapolis

MISSOURI
Asterley Ozark Shop
U.S. Hwy 61-67, De Soto

Craven's Diamond Shop Co.
2008 Bryant Bldg., Kansas City

Cy Miller
110 E. 13th St., Kansas City

MONTANA
Yellowstone Agate Shop
Box 4, Hiway 89, Livingston

NEBRASKA
Hastings Typewriter Co.
518 W. 3rd St., Hastings

NEVADA
Toiyabe Supply Company
Gabbs

Woodfords Cash Store, Woodfords, Calif., P.O. Gardnerville, Nev.

Arthur C. Terrill
15 Water St., Henderson

Rock Hollow, Last Frontier Village Las Vegas

Ken Dunham
P.O. Box 150, Mina

Commercial Hardware Co.
500 E. 4th St., Reno

Nevada Gem Shop
335 East 4th, Reno

Nevada Mineral Laboratories
336 Morrill Ave., Reno

Tonopah Studio
P.O. Box 331, Tonopah

NEW JERSEY
Slidecraft Co.,
Meadows A.V.C. Service, Mountain Lakes

Para Laboratory Sup. Co.
221 N. Hermitage Ave., Trenton

Westfield Lapidary & Sup. Co.
309 Hyslip Ave., Westfield

Garden State Minerals
332 Columbia Blvd., Wood Ridge

NEW MEXICO
New Mexico Minerals
11003 Central N.E., Albuquerque

Deming Agate Shop
1012 E. Maple St., Deming

Adobe Crafters
Rt. 2, Box 341, Santa Fe

NEW YORK
New York Laboratory Sup. Co. Inc.
78 Varick St., New York City

New York Scientific Sup. Co.
28 W. 30th St., New York City

The Radiac Co. Inc.
489 5th Ave., New York City

Standard Scientific Sup. Corp.
34 W. 4th St., New York City

OHIO
Akron Lapidary Co.
1095 Chalker St., Akron

Cincinnati Museum of Nat. His.
Central Pkwy at Walnut, Cincinnati

OREGON
The Rock Market
R. 1, Box 225, Eagle Point

The House of Guns
111 Washington St., Garibaldi

Hodge Podge Agate & Supply Shop
322 Hiway 99 S., Grants Pass

Wrightway Gemcrafters
P.O. Box 4, Hauser

Smith's Fluorescents
Rm. 311-220 S.W. Alder, Portland

Dorothy's Gift Shop
4639 N. Stephens, Roseburg

White's Furniture
1218 M St., Sweet Home

PENNSYLVANIA
Lost Cave Mineral Shop
Lost Cave, Hellertown

Sirchie Finger Print Labors.
922 Chestnut St., Philadelphia

TENNESSEE
Technical Products Company
19 N. Dunlap, Memphis

TEXAS
D & B Engineering Co. Inc.
1510 S. 14th St., Abilene

Dwight's
516 Tyler St., Amarillo

Odom's
Star Rt A, Box 32-C, Austin

Nixon Blue Print Co.
Wilson Tower, Corpus Christi

Greene Brothers, Inc.
1812 Griffin, Dallas

Don A. Carpenter Co.
P.O. Box 1741, El Paso

Bell Reproduction Company
907 Throckmorton, Fort Worth

Industrial Scientific, Inc.
1014 Taylor St., Fort Worth

Ridgway's
615 Caroline St., Houston

Panther City Office Sup. Co.
315 N. Colorado, Midland

Farquhar's Rocks & Minerals
134 Hollenbeck, San Antonio

East Texas Photocopy Co.
308 N. Broadway St., Tyler

UTAH
Dr. H. T. Plumb
2400 Sunnyside Ave., Salt Lake City

WASHINGTON
Fulmer's Agate Shop
5212 Rainier Ave., Seattle

Prospector's Equipment Co.
2022 Third Ave., Seattle

C. M. Fassett Co.,
W. 7 Trent Ave., Spokane

Chas. O. Fernquist
W. 333½ Riverside Ave., Spokane

Tacoma Lapidary Sup. Co.
631 St. Helens Ave., Tacoma

Irwin's Gem Shop
381 Chase Ave., Walla Walla

Williams Lapidary Supply
P.O. Box 50, Waterville

WISCONSIN
C-C Distributing Company
3104 W. Vliet St., Milwaukee

The House of Hobbies
721 W. Wisconsin, Milwaukee

The Stones Throw Rock Shop
221 S. Main St., Walworth

CANADA
Riley's Reproductions Ltd.
630 8th Ave. W., Calgary, Alta.

Milburns Gem Shop
1605 Trans-Canada Hwy., New Westminster, B.C.

Cave & Company Ltd.
567 Hornby St., Vancouver, B.C.

Sharpe Instruments Ltd.
6038 Yonge St., Newtonbrook, Toronto, Ont.

ULTRA-VIOLET PRODUCTS, Inc.
145 Pasadena Avenue, South Pasadena, Calif.

Studies in Coal

III — VARIETIES OF COAL *(Continued from Jan. issue)*

by F. L. Fleener
1415 Hosmer St., Joliet, Ill.

4. *Cannel Coal.* Cannel coal is usually classified with bituminous coal, but there are some physical differences between the two coals that suggest some slight differences in mode of origin. Cannel coal is a compact coal with dull luster and breaking with a conchoidal fracture. It ignites easily, burning with a bright lively flame, which property gives rise to the name *Candle Coal.* Thin splinters of freshly-mined cannel coal can be ignited with a match, owing to the large percentage of highly volatile constituents which it contains. Microscopic examination shows it to be composed almost entirely of spores, spore cases, seed coats, and resinous or waxy products of such plants as lived at the time of the existence of the coal swamps.

Cannel coal is essentially a gas-making coal and in the early days was used extensively for this purpose, as well as for the distillation of oil. This was known as "Rock Oil" and was used for illumination purposes, but the discovery of petroleum in 1859, in Pennsylvania, put an end to distillation of oil from coal and shale.

Green, H. J., in his book Coal, Its History and Uses, gives his interpretation of the origin of cannel coal in these words: "Cannel coals always occur in disk-shaped patches thinning away to nothing on all sides; they frequently merge insensibly into higlhy carbonaceous black shale; and they contain occasionally the remains of fish, spores, and seeds.

"The presence of fossil fish in cannels shows that they must have been formed under water, and they probably consist of vegetable matter which was drifted down into ponds or small lakes and lay soaking until it became reduced to a pulp. The deposit was of course limited in extent by the banks of the sheet of water in which it was formed, and hence the lenticular shape which the beds of cannel coal assume. A certain amount of mud would also be brought into the basin along with the drifted plant material, but being heavier than they, it would fall down first, carrying with it enough decomposing vegetable matter to stain black; in a certain distance all the mud came to the bottom, and the vegetable residue floating on sank slowly and became spread out over the bed of the lake farther on.

"Thus near the mouth of a stream deposits of laminated carbonaceous mud were laid down and these gradually contained less and less mud and more and more vegetable matter 'till they merged into a mass of vegetable pulp. The maceration that it has undergone has to a large extent effaced all traces of vegetable structure in cannel coal, but spores, spore cases, and seeds can still be detected in it."

It is evident from the above explanation as given by Prof. Green, that the amount of such coal formed would not be great, and that the occurrences would be scattered and uncertain in extent. Incentives to seek out and mine cannel coal in any noteworthy amount practically ceased with the introduction of kerosene in place of Rock Oil for illuminating purposes. However, a few mines continued to produce a small amount of domestic fuel for fireplaces and grates, its cleanliness, coupled with its exceptional burning quality of showing long bright flames making it ideal for this purpose. Cannel coal was mined and shipped in bags to some of the Eastern cities as late as the early years of this century, where it was burned in grates by those who still loved the cheerfulness of the open fire.

5. *Bituminous Coal.* This is the great coal of commerce, enormous quantities of it being mined and transformed into energy every year. "Machine power makes possible the difference between modern and primitive man," we read in Miller, G. J. and Parkins, A. E. Geography of North America. "It makes possible our cities, our railroads, our manufacturing industries and extensive commerce, our great churches and schools and much of our recreation and pleasure. In fact, our whole modern social and industrial fabric depends upon it. . . . Coal is the dominant source of that power and hence is fundamental to our well-being."

In composition, the bituminous coal lies midway between lignite and anthracite. It is denser than lignite, is deep black, and comparatively brittle, and breaks with a rough cubical fracture. Bituminous coal burns with a long yellowish flame and gives off a suffocating bituminous odor, along with copious clouds of dense black smoke. It has a much greater heating power than any of the lignites. There are several types of bituminous coal, including the Sub-bituminous Coal, the Coking Coals, and the Non-Coking Coals.

6. *Sub-bituminous Coal.* The term sub-bituminous coal was recently adopted by the United States Geological Survey for the compact, black variety of lignite. Chemically the two varieties grade into each other, so the distinction is largely one of color alone. However, the black lignite is usually a better fuel. Its color is generally a glossy black. Upon drying, it breaks up into thin slabs, thus differing from true lignite, and there is no cubical fracture, as is seen in bituminous coal.

7. *Coking Coal.* This coal has the property of softening and running together into a pasty mass when heated to the point of incipient decomposition, and then, at a slightly higher temperature, giving off its volatile constituents as bubbles of gas. There remains a hard, gray, cellular mass called coke, which is 95% carbon. The enormous quantity of coking coal easily available in the vicinity of Pittsburgh was responsible for making that city the Steel Center of the Nation.

8. *Non-Coking Coal.* Popularly called "steaming coal." This coal resembles coking coal in all outward appearances, but in composition it differs in the ratio of hydrogen to oxygen, and burns freely without softening. Naturaliy non-coking coals are preferred for steaming purposes because of their free-burning quality, which aids in keeping the grates clean.

9. *Anthracite Coal.* This is the hardest of the coals and has the highest carbon content. In anthracite coal the transformation of vegetable matter into carbon approaches its limit, no traces of the vegetable material being in evidence. The technical analysis shows a lower percentage of volatile material and a higher percentage of fixed carbon than any other coal. On this account, it ignites much less readily, and burns with a short flame, but gives a greater heat and is slower burning. Before the advent of oil and gas, it was considered the ideal domestic fuel. Many of the older generation nostalgically recall the old base burner with the array of mica windows around which it was so comfortable to gather on long winter evenings.

Most of our anthracite coal is mined in eastern Pennsylvania, where its peculiar quality is due to regional metamorphism. In a way this area of anthracite forms one of the most valuable resources in the world. It is said that prior to 1930, the value of the anthracite mined in eastern Pennsylvania yearly was larger than the combined output of the world's gold, silver, and lead. The coal is of Middle Pennsylvania age and occurs in faulted complex tight folds; but as the major seams are from six to fifty feet thick, it is easy to understand why they constitute the most valuable coal beds known. However, the increasing use of fuel oil and gas for domestic heating has been reflected in a steady de-

cline in production of anthracite during the past decade.

Areas of anthracite occurring in Colorado, New Mexico and Montana, have quite a different mode of origin. Above we noted that the Pennsylvanian anthracite occurs in the more folded part of the great Appalachian field, where the process of change was hastened by the compression and heat developed in the mountain-making movements, but that in the Rocky Mountain areas occurs where igneous intrusions were responsible for hastening the process of carbonization. In both fields the end product is the same except that in the eastern field the compression brought about the concentration of the coal in larger veins and pockets.

10. *Semi-anthracite Coal.* This subvariety of anthracite has been a very popular domestic fuel for many years. It has such a relatively high percentage of fixed carbon that it is nearly smokeless. Some of the best of this coal has a heating value greater than any of the other coals. It is in great demand for naval use. The well-known Pocahontas Coal of the West Virginia-Kentucky field is a good example.

11. *Carbonite.* Natural coke is formed where hot igneous rocks cut across bituminous coal seams, where air is largely or even completely excluded, duplicating the controlled conditions of the coke oven or retort. Carbonite shows a typical columnar structure perpendicular to the face of the dyke. It often grades into anthracite, which in turn passes into the bituminous coal of the seam. In most occurrences it is an excellent fuel, containing more volatile matter than artificial coke. Carbonite also occurs in Alaska in considerable amount where the bituminous coal has been extensively intruded by igneous rocks. Carbonite occurs in seams like coal in Chesterfield County, Virginia, but your writer has been unable to gather information on this occurrence.

12. *Graphite.* Natural graphite is more or less pure carbon. It results as an end product when the coal-making process is carried on and on until only carbon remains. In schists, slates and limestones it is probably derived from plant and animal remains. It is also not improbable that some graphite is derived from the solid or semi-solid hydro-carbons-petroleum, asphalt, etc. —by extreme alteration. It is now believed that the graphite found in the Grenville series of Canada, was once accumulations of vegetable matter.

(*See table below*)

AVERAGE COMPOSITION OF FUELS (After Parr.)

Material	Composition C	H	O	N	Ash	H_2O	Calories
Oak Wood	50.35	6.04	43.52	0.09	0.37	20.0	3696
Peat	59.70	5.70	33.04	1.56	11.84	14.24	3979
Lignite	74.88	4.99	19.12	1.01	9.35	35.38	3846
Bituminous	83.42	5.29	9.52	1.77	11.28	8.50	6542
Anthracite	93.76	2.72	3.11	0.41	10.80	2.18	7216
Charcoal	84.11	1.53	14.36	....	2.50	....	6626
Coke	95.47	0.67	2.82	1.04	14.80	....	6768

FREE TIME?

Technica, Belgian official Journal of National Committee of Jewelers, Watchmakers, Gold- and Silversmiths, and Noble Metalworkers, reports that in Switzerland a clock has been produced which runs by means of light. It will run 24 hours on energy stored up by a one hour exposure to light. A four hour exposure will wind it up so completely that it will run for four full days in total darkness.

The clock has three openings along its base through which the light energy is captured. These windows are photo-electric cells which transform the light energy into an electric current which activates a 45 gram motor which then steps up the torque 10,000 times and winds the spring.

THE MILLER CHONDRITE

by H. O. Stockwell and Russell A. Morley

P.O. Box 563, Hutchinson, Kansas; 399 North 18th Street, Salem, Oregon

ABSTRACT

The Miller, Lyon County, Kansas Meteorite (ECN=+0960,386; cl.=spherulitic chondrite, crystalline, breccia-like, Cckb) was discovered by Mr. Clinton Langley, in May 1950 on the Langley farm 2 miles west of Miller, Kansas. The Miller aerolite has a total weight of 974.0 grams and a specific gravity of 3.048 at 27°C. The main mass is now preserved as a part of the H. O. Stockwell meteorite collection.

The Miller meteorite was discovered by Mr. Clinton Langley, in May 1950, on the Langley farm 2 miles west of the town of Miller, Lyon County, Kansas, near the center of the Admire pallasite field. The Miller chondrite is the second meteorite recovered by Mr. Langley in the past 3 years. His first meteoric discovery was that of a 4.536 kg. Admire pallasite which he recovered in the spring of 1948, while engaged in listing corn. This discovery followed a visit in April of the same year by Mr. H. O. Stockwell. While visiting Mr. Langley, Mr. Stockwell showed him specimens of various kinds of meteorites and suggested that additional Admire pallasites might be found on his land as they had been in the surrounding area since 1861.

In May 1950, while discing a bean field, he discovered a rock unlike the

The Miller chondrite (essentially natural size).

Admire specimens, but similar to some shown him by Mr. Stockwell. He retained this specimen until March 23, 1951, when he gave it to Mr. Stockwell, who recognized that it was an entirely new meteorite and immediately submitted a slice to me for further study. The area of the land on which both of Mr. Langley's finds were made totals only 160 acres. This gives some idea regarding the possible concentration of different meteoric falls in a given area. The total weight of the Miller meteorite is 974.0 gram.

The Miller chondrite is the third meteorite recovered from Lyon County, Kansas. The other two meteorites are the Admire (ECN=+0961,387; cl.= Pr) found in 1861, and described in 1902, and the Elm Creek (ECN=+ 0962,385; cl.=Cco) found in 1906 and described in 1907.

The exact location of the Miller is in the S. E. ¼ Sec. 24, T 16, R 12 W. on the Langley farm which is located 2 miles west of Miller, Lyon County, Kansas, in the Eskridge quadrangle. The longitude of the place of find is approximately W. 96°1′ 22″ and the latitude N. 38° 37′ 30″. This position has the equatorial coördinate number (ECN),+0960,386.

The following data are based upon observations made on a slice 53 mm. X 46.8 mm. X 9.6 mm. and weighing 42.9 gram. The Miller meteorite is an old metal-poor spherulitic chondrite crystalline, breccia-like, cl.=Cckb, having a specific gravity of 3.048, at 27°C. as determined with the aid of a precision Jolly balance. The chondri on the surface of the meteorite have in many cases weathered out entirely leaving only depressions; however those still imbedded brake unmistakably with the rest of the matrix. The weathered surfaces show exfoliation, probably due to hydration. The color is mottled black, brown, and yellow-brown. There is a number of small fractures running through the mass. On a polished surface the meteorite shows a distinct zone of alteration extending around the outer periphery and toward the center to a depth of from 4 mm. to 10 mm., undoubtedly due to terresterial weathering. The original fusion crust has been completely destroyed by weathering. The over all dimensions are as follows: length, 112.8 mm.; width 79.4 mm.; thickness 76.2 mm. The main mass of the Miller aerolite weighing 927.7 grams is preserved in the H. O. Stockwell collection.

* * *

A very few subscribers have reported receiving copies in which some of the pages were blank. Replacement copies will be furnished on notifying Dr. B. H. Wilson, 406 Grover St., Joliet, Ill.

* * * * *

Answers: **Test Your Knowledge.** Check the ones which you have answered correctly.

a. (1) A form of calcium sulphate differing from gypsum in being harder and lacking water of crystallization.
b. (1) Natural sodium chloride (NaCl). Common table salt.
c. (1) Fine-grained sedimentary rock formed from clay-like deposits becoming mildly indurated.
d. (1) Metamorphic quartz rock formed from sandstones having gone through secondary cementation.
e. (1) A fossil imprint molded by the form of some previous living organism.
f. (1) Hydrous silicate (quartz) frequently showing a beautiful play of colors (opalescence) forming "gem opal."
g. (2) A pulverulent oxide of iron and other metals useful as pigments, usually red or yellowish to brown.
h. (2) Miner's term for a zinc ore. A zinc sulphide; sphalerite, also known as zinc blende.
i. (2) Reflection of light in a special manner. Brightly or with brilliance.
j. (3) The continued emission of light by a substance following exposure to light—sometimes by heating or electrical discharge.
k. (3) A phenomenon frequently found on efflorescent minerals as cobalt blooms. A surface alteration or acicular crystalline growth.
l. (3) A fissure in the country-rock filled with some mineral. In miners' usage, a lode, vein, or ledge is a deposit of valuable ore existing between definite boundaries.

Material Used by the Southwest Michigan Indians In the Flaking of Stone Artifacts

by Louis P. Ueck
957 Columbus Ave., Benton Harbor, Mich

History students well know that primitive man somehow learned by flaking flint he could obtain a desired shape. The men of the stone age are known to have used flint approximately 100,000 years ago. Those of "Swiss Lake" and the cave dwellers of western Europe were stone-workers of flint.

And so the Indian by long experience as a stone-worker, became a fair geologist, recognizing the rocks that most suited his needs, to know the selected stones characteristics, such as hardness, texture, cleavage, and fracture, that there would be the least possible rejects or discards. Certainly such a specialist could also be called a fair mineralogist. For he well knew that one material was suited for pipes, another for axes, and still another for arrowpoints, substituting only when suitable material was not available. Hard, brittle, and fine textured rocks were eagerly sought after. Our mound builders depended on trade for their gemmy material, of which flint was their favorite. The reason for flint above all other material lies in its outstanding quality. By far, the greater percent of material found locally is of the poorer grade of the so-called flint or chert variety with an indefinite dividing line. Since all specimen of both flint and chert have a virtually pure silica content, the difference must lie in its porosity. Since one grades into the other we shall first attempt to define flint, which is considered the superior of the two.

Flint occurs in the form of nodules and concretions, imbedded in clay, in chalk, in hard and soft limestones, and in pure mass deposits. Such a mass deposit is the well-known "Flint Ridge" in Licking County, Ohio, where quality flint has been taken from open pits, to this day, very much in evidence. No doubt it was transported to all parts of the country.

When first taken from the quarry, flint contains a good deal of moisture and is dull glassy. After a long period of hydration or evaporation, the salts or impurities of any soluble minerals from the interior, aided by the ultra-violet rays of sunlight, change the color on the surface. The longer the exposure to sunlight, the deeper will be the color and the penetration. In due time a film or coating is formed which is called patina.

Some flint is fossilized, that is, it contains remains of sponges, one-celled animals, and one-celled plants. Therefore, it is most common in the Cretaceous chalk formations that were laid down as sedimentary material about 200 million years ago.

Here in Southwest Michigan, flint is found in the glacial deposits and can be found south of South Haven on Lake Michigan beach as irregular shaped nodules of various sizes up to 6 inches, usually dark grey in color and of fair quality. Many specimens have been collected from this locality for study and display.

According to Anthropological papers, the Pottawattomie Indians associated flint with war. Therefore, it was only natural for our early settlers to call any Indian artifact, flint. Nevertheless, the arrowpoints the writer has collected locally are less than 10 percent flint. The balance of material consists of a poorer grade, generally called chert. Mineralogically speaking, flint is cryptocrystalline quartz (which means the grains are too small to see without the most powerful microscope).

Chemically, flint is silica. Silica is a compound of silicon and oxygen. It is the hardest of the common minerals, ranking seven in the scale of ten. It can be chipped in any desired direction with good conchoidal fracture (meaning seashell shape break). It weighs slightly less than that of vitreous quartz. Its dark color is said to be of organic nature, since its shade changes or disap-

pears under certain light and heat conditions.

The origin of flint nodules appears to have come about while volcanic eruptions forced siliceous hot percolating water up through openings in the earth's limestone crust. This brought about a replacement of the lime carbonate by the hot siliceous water changing it into a colloidal formation in alkaline seas. By the rather simple process of "concentration and evaporation" a jelly-like globular form took shape. If fossils were present amid ooze and mud on the floor of these seas, they would have been imbedded into the formations. While in the colloidal state, this fluid material would find its way into veins, pockets and cavities. In certain dolomite and limestone formations it would solidify in irregular shaped forms, only later to be brought to the surface by the ever changing and uplifting of the earth's crust, to be eroded. Specimens of such irregular forms of flint from Texas can be seen in the writer's collection of rocks and minerals.

Chert is similar to flint in many ways. In fact, much that is considered flint is in reality, chert. It has quite a different mode of formation. It is coarser and much less uniform in texture, lighter in color and weight, and naturally more porous. Its porosity puts it in the impure flint class. Chert ranges from impure to that so porous that it cannot be worked into an artifact. One may compare the difference in grade of chert with that of obsidian and pumice. The greater part of the writer's locally collected flaked artifacts is of the chert variety. Light to dark grey organic coloring is common, consequently always opaque. Fracture is less conchoidal than in flint; the luster always dull. Chert also occurs as nodules, concretions, in veins and in bed deposits. At Bayport, Huron County, Michigan, hundreds of nodules can be found, many of fantastic forms. These appear to be concretions that have been weathered out of the softer limestones. Chert and its varieties usually are associated with limestone and dolomite strata of all the geologic periods. Being of volcanic origin the association is obvious, and in certain localities brought to the surface by the ever changing earth's crust. Locally, we find chert concretions in glacial drifts and on Lake Michigan beaches in various sizes. Many show concretionary ring growth and fossils that lived 350,000,000 years ago.

The origin of chert like that of flint is believed to have forced its way up as volcanic magma flows, thru submarine springs of percolating silica solution over beds of limestone and dolomite that were chemically changed by the process of replacement, thus forming lumps or jelly-like masses which settled into crevices or deposited it on the sea bottom where escaping gases degraded it to its porous state. Many fossils were imbedded in such deposition.

Today neither flint nor chert has much commercial value. Both are nuisances to the quarrymen who produce limestone for industrial purposes and fertilizers.

Novaculite, also a cryptocrystalline quartz variety, ranks next to flint in quality for arrowhead making. Although not too well-known, it is found in many local artifacts, and was used extensively in certain localities by the Indian. It is found in Arkansas and is extremely fine-grained homogeneous chert, which has been metamorphosed by intense agitation. This accounts for its varied color, usually pale grey, sometimes beautifully mottled, has a marked conchoidal fracture, translucent only on thin edges. It is used today for high grade whetstones and hones.

Jasper includes, in a general way, nearly all varieties of impure opaque colored amorphous quartz; texture, coarse to very fine grained, often with deep colors in red, black, yellow and brown and easily recognized by its shiny surface. The lapidist finds it readily takes a high polish. Locally it is found in stream gravels, Lake Michigan beaches, and in gravel pits, rarely of large size. Its colors are due to impurities, usually clay or iron oxidations. Jasper also occurs as small pebbles in

siliceous glacial boulders, formally massive and brought down from the north with the Saginaw glacial lobe and can be found in attractive colorful conglomerates. A few small jasper conglomerate specimens can be seen in the writer's rock collection.

Chalcedony, an amorphous quartz material translucent with a waxy luster, with colors of white, yellow, brown, green and better known red carnelian. Chalcedony frequently occurs as linings or fillings in geodes and cavities in rocks, often mammillary, or grape-like in structure, not too often found as an arrowhead locally, but if it is, it is highly prized and usually mistaken for an agatized specimen.

Agate, always sought for as a gem material, is one of the finest materials for arrowheads. It also has its origin from percolating silica-bearing solution, brought on by volcanic action. It too, is of the cryptocrystalline variety of quartz, like that of chalcedony.

Locally, an agate arrowpoint is rarely found. But if found it is at once held up to the light to display its translucent quality. Out west the agatized arrowpoints are quite common. Montana is without a doubt the most noted state for moss agate. However, Wyoming Sweetwater agate fields should also be mentioned for it was in the well-known Sweetwater locality that the writer and his wife, on their recent western trip, collected hundreds of these little gem pebbles, all within an hour's time, on slightly rounded hills of about two acres of sagebrush territory. All were surface finds, on rain and wind eroded soil. They appear to run small but of excellent dentritic quality for arrowpoint making. Locally, Lake Superior agates, despite their small size are of the finest quality but far too small for practical use as an Indian artifact. Lake Superior agates occur in the basalts of the ancient Killarney chain of mountains that extended from Minnesota to Upper Michigan eastward into Canada and can be found in central-west Wisconsin in glacial drifts, usually as nodules of the banded type. All agates had their beginning as secondary deposit in cavities, gas bubbles or amygdules, as they are termed, meaning "almond shaped" in Greek. Percolating waters obviously seeped into these gas bubbles in lava, where in due time they attained the consistency of jell; with the aid of temperature, pressure, and evaporation, the process was complete. With the wearing down and disintegrating of the Killarney mountains, later to follow up its destruction, the great Labrador glacier completed the job of shearing them down to the foothills and exposing the basalt rock and scattered the little gem material far and wide for us to collect.

Keweenaw County is the well known copper county of Michigan. It has produced nearly all copper artifacts found in Indian mounds, which is definite proof that the moundbuilders were tradesmen. Copper arrowpoints are rarely found in this locality, nevertheless, native copper specimens have been found here by members of this organization.

Obsidian, a volcanic glass not concerned locally, was nevertheless much in evidence in our western states. It is another material that has its origin in volcanoes. In fact, all material so far mentioned for artifact use is the direct result of volcanism, which today is still very much active in parts of the world. Therefore, the age of any aforementioned materials cannot be definitely given, unless it occurs in situ (meaning if found in its original geologic formations). For instance, the chert from Michigan's Bayport limestone was deposited during the carboniferous period about 300,000,000 years ago. Likewise, Lake Superior agates were in the making during the Keweenawan revolution of pre-cambrian time of over 500,000,000 years ago.

Much could be written on foreign material that is found in Indian artifacts. However, this paper was intended to give additional information on local material only. May it be informative and clarifying for our students in archeology.

"Meet Me in Saint Louis"

at the

THIRTEENTH ANNUAL CONVENTION

of the

Midwest Federation of Mineralogical and Geological Societies

June 26-27-28

at ST. LOUIS UNIVERSITY HIGH SCHOOL

4970 Oakland Avenue, St. Louis, Mo.

Featuring

Many Beautiful Exhibits of . . .

MINERALS • LAPIDARY WORK

GEOLOGICAL EXHIBITS • GEMS

Conducted Field Trips — Banquets — Speakers — Two Day Post Convention Field Trip to the Highly Mineralized Area of the Ozarks — Hear the Municipal Opera — Ride the Mississippi River

Meet Your Friends and Enjoy Yourself in the Land of the Ozarks

READ THE EARTH SCIENCE DIGEST FOR OTHER DETAILS

For Information Write

Convention Chairman — **K. E. GIBBONS**

6421 Hobart Avenue, St. Louis 14, Missouri

Midwest Federation Bulletin

Edited by Bernice Wienrank, Staff Member

St. Louis Gem and Mineral Society, host to the 1953 Midwest Federation Convention, reports that publicity about the convention is bringing in new members almost as fast as it can handle them. Many of the new members have outstanding gem and jewelry collections.

On Feb. 6 SLG&MS heard Dr. Leroy Sharon, of Washington University, speak on "Labradorite." Dr. Sharon, who spent some time in Labrador studying its minerals, said that the finest gem-quality Labradorite is found in the remote northern part of Labrador. The only practical way to reach this area, which is almost all lakes, is by sea-plane. Dr. Sharon's splendid collection of rough and polished Labradorite was on display.

Chicago Lapidary Club will award 20 gold medals to first place winners in its third annual competitive Gem and Jewelry Show. In addition, the best-of-show winner will receive the Dalzell Award, a gold medal set with gems of ruby, sapphire, titania and the club's own stone, Lake Superior agate. The show is to be held May 23-24 at the Gage Park field house, 55th Street and Western Avenue, Chicago, Ill. The prize winning exhibits will be on display during June at the Chicago Museum of Natural History and July 13-25 at C. D. Peacock's Jewelry Store.

Regular meetings of CLC are now held at the Gage Park field house on the first Thursday of each month. Its former meeting place, the Grand Crossing park field house, was destroyed by fire on Jan. 21.

Wisconsin Geological Society's fine publication, *The Trilobite*, has now been placed in the Library of Congress, Washington, D. C. A permanent file of the bulletin is also kept in the world-famed British Museum of Natural History in London, England. *The Trilobite*, edited by Dr. H. W. Kuhm, well deserves these honors; its editorial standards are kept high and it can always be counted on to contain worth-while articles.

Marquette Geologist Association on March 7 was carried back nearly two million years to the earliest evidence of man, when Dr. Frank Fleener, historical geologist, outlined "Man's Place in Nature," for club members.

Mineralorist Society of Joliet experienced one of its best treats in many years when it was addressed at its regular lecture meeting on March 19 by Mr. LaFayette Funk of Bloomington, Illinois, a member of the Central Illinois Mineralogical Society of Decatur, Illinois. Mr. Funk has made many expeditions throughout the West and into Mexico in recent years for the purpose of collecting minerals. Six tables were needed to display the minerals that he brought with him. These consisted of fifty trays of excellent cut specimens and many fine museum pieces. His talk was illustrated with beautiful Kodachrome slides of both minerals and scenery.

Akron Mineral Society's Annual Gem and Mineral Exhibit will be featured April 22 to May 3 in the Akron Museum of Natural History.

One of the eye-catchers of the show will be President Treese's revolving five-shelf, lighted display table. The first shelf will display polished spheres; the second, crystals, the third, a variety of cabochons; the fourth, Lake Superior agate jewelry; the fifth, a crystal city built of clear quartz crystals.

Central Iowa Mineral Society recently heard Mr. Keith Tanke, a registered gemologist and formerly associated with the Gemological Institute of America, speak on "Gems in General and Jade in Particular." Afterwards Mr. Tanke identified various gem materials for members of CIMS.

Rochester Earth Science Society at a recent meeting heard Mr. H. R. Straight, past president of the Midwest Federation, and Mr. B. H. Beane, famous for his work with crinoid fossils, give a joint account, illustrated with Kodachrome slides, of their recent trip to Mexico. A detailed account of the trip may be found in the January issue of *Trade-Winds*. Mr. Beane exhibited his beautiful crinoid slabs. These slabs were one of the oustanding attractions at the Midwest Federation convention in St. Paul last July and it is hoped that Mr. Beane will again display them at the Midwest Federation convention in St. Louis this coming June.

Earth Science Club of Northern Illinois met on March 13 to hear Mr. E. A. Armstrong's lecture, "The Great Rock Saucer," which is a discourse on the limestone deposit of the ancient Silurian sea and its present-day effect on the Chicago area.

Michigan Mineralogical Society has bestowed life memberships on John and Lillian Mihelcic in recognition of their many contributions to the society. They are co-editors of the society's excellent bulletin, *The Conglomerate*. John is also a past president of the society.

Minnesota Mineral Club held an installation dinner for its new officers on March 13. Mr. Leroy Peterson, South Riverside, Minneapolis, was elected president.

On April 12 the group, sponsored by the Geology Department of the University of Minnesota, held an exhibit of rocks and minerals in the main ballroom of the Coffman Memorial Union in Minneapolis.

Illowa Gem and Mineral Society at its April meeting heard Charles Adams of Rock Island, Ill., discuss the diamond and its various uses. Mr. Adams also exhibited his valuable diamond collection. At the end of the program an instructive film, "The Growth of Rock Crystals," was shown.

Visitors to Davenport, Iowa, during May should not miss IG&MS' annual exhibit of gems, minerals, shells, fossils, etc., to be held this year in the large rotunda of the Davenport Public Museum, May 6-31. It is one of the largest shows of its kind in the Midwest.

Evansville Lapidary Society, organized Jan. 31, 1953, elected Ida Black as its first president. This club is the first of its kind to be formed in the state of Indiana. Regular monthly meetings are held in the YW-Craft Shop, 11½ Main Street, Evansville, Indiana.

Chicago Rocks and Minerals Society on March 14 was addressed by Dr. Ben Hur Wilson, head of the Joliet Junior College's Earth Science Department and co-author of *Quartz Family Minerals*. Dr. Wilson chose as his subject, "Nature's Building Blocks."

The Midwest Federation will send a complimentary copy of its official publication, the *Earth Science Digest*, to each new member of Midwest Federation societies whose name and address are submitted by his club. Note: Club secretaries, please send lists of new members to: Dr. Ben Hur Wilson, 406 Grover Street, Joliet, Ill.

Humboldt Gem and Mineral Society is furnishing the Eureka Museum (Eureka, Calif.) with grade A mineral specimens. Museums throughout the country have been enriched by similar donations from amateur collectors. Does your local museum have a comprehensive display of minerals, fossils, etc.?

San Diego Lapidary Society's Katherine White and Dorothy Keirstead deserve emeralds for the fine work they are doing in teaching patients at the San Diego Naval hospital the art of lapidary. Other members of the society have donated stones for the boys to work on.

SDLS has elected the following officers of 1953: Big Jewel (president), Lee Weatherbie; Next Big Jewel (1st vice president), Fred Gruner; Growing Jewel (2nd vice president), John White; Monied Jewel (treasurer), Ada Harrison; Working Jewel (secretary), Ruth Weatherbie.

Mineralogical Society of Pennsylvania was recently conducted on a tour of the Foote Mineral Company's plant. Highlight of the tour came when the company permitted the group (125 members and friends of MSP) to loot its stockpiles, which contain minerals from all over the world.

Hollywood Lapidary Society on March 12 heard Mr. A. B. Meiklejohn, mining engineer for the Uranium Corporation, talk on "Uranium in Southern California." Mr. Meiklejohn displayed samples of uranium ore and demonstrated their reactions to a Geiger counter and an ultraviolet lamp.

Santa Fe Gem and Mineral Club has installed a beautiful handmade cabinet for displaying rocks and minerals in the quarters of the Santa Fe, New Mexico, Chamber of Commerce. The rock and mineral displays have the admiration of both local citizens and tourists.

New York Mineralogical Club was taken on a pictorial tour of Morocco by Professor Cornelius Hurlburt of Harvard University when he presented an illustrated lecture on "Wines and Mines of Morocco" at a recent meeting. Dr. Hurlbut's slides and comments revealed that both primitive and modern mining methods are used in Morocco. The most important mines in this area are those producing fluorspar, iron, anthracite and phosphate. In association with the phosphate deposits is found an abundant supply of well preserved sharks' teeth.

Colorado Mineral Society's charter member, Mr. J. E. Wooley, has donated an outstanding collection of agates to the Denver Museum of Natural History, where the group meets on the first Friday of each month.

Delvers Gem and Mineral Society (Downey, Calif.) recently heard A. G. Ostergard, of the Glendale Lapidary Society, relate some of the experiences of his two-and-a-half month, 6,000 mile hunt for gems and minerals in Mexico. His display of vanadium, wulfenite, black tourmaline, manganite, plume agate, white garnets, adamite, aragonite, calcite and apatite testified to the success of his trip.

Oregon Agate and Mineral Society recently heard Ralph S. Mason of the Oregon Geology Department give an enlightening talk on "Oregon Rocks and Minerals." Mr. Mason displayed samples of the minerals and their products alongside cut-out maps which indicated the localities in which they are found.

El Paso Mineral and Gem Society at its February meeting presented a book on silver-smithing and gem-cutting to its outgoing president, Mr. A. L. Patterson, and to its incoming president, Mr. R. H. Miller, a rock-hammer gavel made of yellow honey and brown cave onyx.

Everett Rock and Gem Club on March 9 viewed a color film depicting the break-up of an Alaskan glacier and the emptying of the lake that it had formed. This event was recently featured in an article in the *National Geographic Magazine.*

Plans are being made by ER&GC to demonstrate some phase of its hobby at each meeting. First on its list is "Faceting."

RECOMMENDED READING FROM ALL (AVAILABLE) SOCIETY SOURCES

"Acoma—City in the Sky," by Oriel Grand-Girard, March issue of the *Pick and Dop.* A brief history of the Acóma Indians of New Mexico.

"Steep Rock Iron Ore Mining Venture," by Leslie R. Bacon, March issue of *The Conglomerate.* An engrossing account of how Steep Rock Lake was drained to permit mining the hematite at its bottom.

"Water — Our Most Indispensable Mineral," by Richard Myers, February issue of the *Keystone News Letter.* Will remind many mineral collectors that water belongs to the mineral kingdom.

"Celite—the Story of Diatom," by Thomas Ludlow, March issue of *Earth Science News.* Living diatoms form the "grass of the sea," but fossilized diatoms are more important to man.

(*Concluded on page* 38)

RARE
WASHINGTON WOOD

TEREDO WOOD: Petrified; one half of which was tubes drilled by shipworms, now filled with agate or quartz. Interesting and rare. Slices 2 to 8 inches, 60c per inch.

BOG WOOD: The litter which covered the forest floor: twigs, leaves, wormdust, etc., all silicified into an agate-hard compact mass. Polishes beautifully, showing each twig clearly. Slices, 40c per inch; chunks, 1 to 10 pounds, 80c per pound.

Select agatized or opalized wood, not merely petrified. Solid and colorful, 45c per pound.

What do you want from Washington? If I haven't got it, I'll get for you. Complete satisfaction guaranteed. Please add approximate postage on chunks.

HERB BROWN, Rocks
Rt. 2, Box 927H, Bremerton, Washington

MIDWEST (*Continued from page* 37)

"Jade," by William Menzel, February, March and April (three installments) of the *M.G.A. Bulletin*. Includes a complete list of the names given to the various kinds of jade and its imitations.

"The Story the Rocks Tell in Wisconsin," by Dr. Katherine G. Nelson, March and April issues (two installments) of the *Tribolite*. A lucid account of the geologic history of Wisconsin as revealed by its rocks.

Societies are urged to send reports of their activities to this department, c/o Bernice Wienrank, 5345 Harper Ave., Chicago 15, Illinois.

* * *

. . . And then subscribe to the Earth Science Digest — t'will do us both good.

What every collector should have
NEW LONG WAVE LAMP
This lamp will fluoresce 90% more minerals than any other lamp, a Little Wonder.
With 1 dozen fluorescent minerals in sizes 2x2 and 3x4 only $17.50.
New Jersey fluorescent minerals and New Jersey Zeolites. Send for list, for trade.
JOHN OBERT
106 Fournier Crescent, East Paterson, N. J.

THE NORTHWEST FEDERATION OF MINERALOGICAL SOCIETIES

Through Its Host Club

THE OREGON AGATE & MINERAL SOCIETY

Cordially Invites Members of the Eastern and Midwestern Federations, and Readers of The Earth Science Digest Everywhere, to Attend the Greatest

GEM AND MINERAL SHOW

Ever Presented in the Pacific Northwest.

Lectures, Displays, Demonstrations, Field Trips
Public Auditorium—Third and Clay Streets—Portland, Oregon

Labor Day Weekend — Sept. 5-6-7, 1953

Admission 50c—Three Days $1.00—Exhibitors Free

Include the City of Roses in Your Vacation Plans

For Information Write:

LLOYD L. RUFF, Convention Chairman
4931 N.E. Glisan St., Portland 13, Oregon

BOOK REVIEWS

"EXPLORING OUR NATIONAL PARKS AND MONUMENTS," 3rd edition by Devereux Butcher, Houghton Mifflin Co., Boston, 286 pages, $2.50 paper bound, $4.00 cloth bound.

This new and enlarged edition, like the previous ones, was prepared under the auspices of the National Parks Association, and is very well illustrated, and comprehensive. The black and white photo engravings illustrating each park and monument are very high quality. Two Kodachromes adorn the covers.

Description of each locality includes the location, how to reach it, when it opens and closes, the accommodations available in the park and neighborhood, when it was established and why, geological and archeological features, flora, fauna, birds, and climatic conditions.

Brief descriptions of other nature reservations and prehistoric ruins in the United States, three good short articles on Indians and the Wilderness, a description of the National Park Service and the Standards, and an excellent list of standard works for further reading, are included.

The need for the parks and their protection from commercialism, and the Bureau of Reclamation, is emphasized throughout the book. H.M.K.

"PRINCIPLES OF INVERTEBRATE PALAEONTOLOGY," by Robert R. Schrock and William H. Twenhofel. 1953, McGraw-Hill; ppi-xx, 1-816 (New Second Edition). $12.00.

Here is the first version in eighteen years of this comprehensive text on invertebrate fossils. Expanded coverage is given to more than twenty of the major animal Phyla exclusive of the vertebrates. Groups rich in fossils, such as the Brachiopoda, Mollusca and Echinodermata receive special emphasis. There is a chapter devoted to conodonts, and the various worm Phyla, even though scantily represented as fossils, are grouped together into a separate chapter also.

The general morphology and internal anatomy of each group is discussed in detail. There are sections also of varying length on the embryology, ecology, and paleoecology of many of the groups. The fossil record, geologic history and known stratographic range of all phyla are developed at some length, oftentimes with the aid of charts. Special attention is given to the taxononic divisions within each Phylum down to Order level and the distinguishing structural features of each group are fully described.

This work is written for the intermediate or advanced college student, and amateur geologists who have a background in the biological sciences or some previous knowledge of the field will find it a valuable reference volume. There are a large number of good illustrations and diagrams. The bibliography at the end of each chapter contains advanced reference works and the more important articles by specialists on each subject.

The worth of this book to the elementary student is problematical, because of the detailed morphological and anatomical terms used, and the technical style of writing which this volume shares with advanced scientific texts generally. B.S.

RECORD OF THE ROCKS, by The Ronald Press Co., New York

An unusual book, in many respects, by Horace G. Richards, associate curator of geology and paleontology of the Philadelphia Academy of Natural Sciences, attempting to interpret the record of the rocks and construct a history of our physical world which the historical geologist must recognize is never complete in any one place.

In his long specialization in the eastern part of North America, the author has found that region to be particularly rich in source materials for the study of general geology from which he has drawn extensively. We feel that it will make an excellent textbook, having many special features to recommend it, some of which are quite unique.

Outstanding among these features are the many fine illustrations, tables and graphs with which the text is profusely illustrated. Everywhere throughout the book these illustrations expand

the somewhat condensed printed material many fold, making the entire presentation entirely adequate and satisfying.

Especially helpful are the several paleogeographic maps correlated with many fine fossil illustrations which are distributed throughout the text and which the writer feels to be unexcelled in any similar recent publication. This is a book which every serious student of geology, whether he be the rockhound or professional type, might profitably add to his library of geological literature. B.H.W.

A NEW COUNTRY EXPLORED

The wild, hilly country through which a railroad is being pushed northward from Seven Islands to the Ungava iron deposits is being explored by the Geological Surveys Branch of the Quebec Department of Mines. The Honourable C. D. French, Minister of Mines, has released a preliminary geological report on that part of the region, the Nipisso Lake area, that was investigated for the Department in 1952 by H. R. Hogan.

The area described comprises about 200 square miles and is about 50 miles north of Seven Islands. The new railway crosses it from south to north. The rocks are all of Precambrian age and are either of sedimentary or of igneous origin. They are all more or less highly metamorphosed. Small percentages of nickel and copper were found in some of the rocks.

Copies of this report (P.R. No. 280), accompanied by a preliminary geological map on the scale of one inch equals one mile, may be obtained from the Department of Mines, Parliament Buildings, Quebec, P. Q., or from one of the other offices of the Department.

ROCKHOUNDS IN THE MAKING, by Marguerite Beymer. Published by the author, 1953. 112 pages, $2.50.

This is a modest book with a freshness and originality of idea that merits attention. The author asked the question, "From whence come these people, these Rockhounds, and what impulse or set of circumstances, in each, created the situation whereby a Rockhound was born?"—and then she presents the answers of 68 well-known and dedicated Rockhounds. These answers are as various and readable as they are enlightening.

The book is well done, with many black-and-white illustrations and one gorgeous color plate. It well deserved a "hard" cover. J.D.W.

DE RE METALLICA, by Georgius Agricola, translated by Hon. Herbert C. Hoover and Lou Henry Hoover. Dover Publications, Inc., 1780 Broadway, N. Y. 19, N. Y. $10.00.

In reviewing this book, it is not easy to do better than to quote from its own preface: "We do not present De Re Metallica as a work of "practical" value. The methods and processes have long since been superseded: yet surely such a mile stone on the road of development of one of the most basic of human activities is more worthy of preservation than the thousands of volumes devoted to records of human destruction."

One lesson to be learned from the book is the experience of Agricola himself. He realized the dearth of realistic information in the field of mining and metallurgy. He appreciated the actual need for a compendium of all pertinent information to be available to the toilers in this field. He knew all too well the great amount of work required to do the task; would his body and mind be strong enough and his life long enough to permit him to do it? But he took up the challenge. He staked out the field and dealt with each part carefully and exhaustively so far as actual facts could

$1.00 BUYS . . .
A GEODE For Your Collection.
Mailed Postpaid Anywhere in the U. S. A. From . . .
THE SMITH'S GEODE INDUSTRIES
411 W. Main St. • New London, Iowa

CY'S ROCKS Minerals and Gems
WE TRADE, BUY AND SELL
Tourist Rooms by Day or Week
On Estes Park Highway 34
5½ Miles West of
Loveland Colorado

be determined and went to great pains to check and double check his statements. He added his own theories primarily as theories (many of which have since proved to be largely correct), and in putting it all in shape for posterity, he went to great detail to make everything clear and understandable. The very fact that his book remained *the book* in its field for 180 years attests to the masterful work he did.

Even as Agricola did extensive research for his work, the editors of this edition also did extensive research and collateral reading to insure that everything is presented accurately, authoritatively, and in great detail. With all this, they have been able to retain a certain quality to the work, perhaps largely due to the fine woodcuts, that gives it the good quaint feeling of an old book.

Those who are interested in the "history and/or development" of mining and metallurgy, the many admirers of the Honorable H. C. Hoover, and those who are proud of a well rounded out library of good books — all these should be eager to add this book to their libraries. B.J.B.

TOM ROBERTS ROCK SHOP
MACHINES • MATERIALS • SUPPLIES
1006 South Michigan Avenue
Chicago 5, Illinois
Monday thru Saturday — 10:00 a.m. to 5:00 p.m
Open until 10:00 p.m. Wednesday
Telephone WAbash 2-7085

BUYING AND SELLING AGENTS
for
Mines, Exporters, Importers
ASSOCIATED MINERS
6972 Sheridan Rd., Chicago 26, U.S.A.

Fire Agate Specimens $1.00
Arizona Tear Drops..$2, $1, 5 for $100
Obsidian Nodules .....5 for $1.00
Desert Rose $1.00
All Prepaid
Mrs. Sally Ellison
BOX 846 CLIFTON, ARIZONA

ROCKS *and* MINERALS
(A Magazine for Collectors)
If you collect rocks, minerals, sands, pebbles, crystals, ores, gems, ROCKS and MINERALS is your magazine. Founded 1925. Issued once every two months, 112 pages per issue, $3.00 a year (sample copy 60c.)
ROCKS and MINERALS
Box 29 • Dept. ES • Peekskill, N.Y.

DEPENDABLE DEALERS USE THIS EMBLEM
★
AMERICAN GEM & MINERAL SUPPLIERS ASSOC.
145 Pasadena Avenue • South Pasadena, California

TURQUOISE SPECIMENS
One each from six different mines, identified. Satisfaction guaranteed.
Postpaid for $1.00.
LOST MOUNTAIN GEMS
BOX 5012 • PHOENIX, ARIZONA

Two-color embossed business cards $4.95 per thousand; one-color $3.95 per thousand.
WRITE FOR SAMPLES
Rubber stamps made to order, 2-line $1.05; 3-line $1.45, up to 3 inches long.
OFFICE SPECIALTIES
2364-C No. 58th Street • Seattle 3, Washington

A NEW FIND
ZIRCON or ALLANITE
or both
in FELDSPAR
California Location
Send for details and prices
Free List
WARREN C. BIEBER
7229 Remmet Avenue
Canoga Park, Calif.

TRANSPARENT PLASTIC BOXES
Over fifty sizes and types of transparent plastic boxes. May be used for display, merchandising or cataloging collections. Price list free upon request. Dealer inquiries welcome.
JEWELERS TOOLS, SUPPLIES AND MOTOR ACCESSORIES
Our 96 page illustrated catalog 50c. Catalog free to dealers upon request.
Schrader Instrument Company
Department ES Independence, Iowa

Classified Ads — Rates: 35 cents a line, 3 lines for $1.00.

BOOKS FOR COLLECTORS AND LAPIDARIES—*Gem Trail Journal* for your field trips, price $2; *Indian Silversmithing* is an excellent work for the lapidary, $4.75; Dake's Gem Cutting $2; English's Getting Acquainted with Minerals $4.50; Dana-Hurlbut's Minerals and How to Study Them $3.90. Ask for other titles. Paul VanderEike, Rt. 2, Box 1168, Vista, Calif.

QUARTZ CRYSTALS var. "Herkimer Diamonds." Matrices, groups, etc. on approval. CLAUDE D. SMITH, Box 291, Geneva, N.Y.

TONOPAH, NEVADA, is where C. C. BOAK lives, with his outstanding, scientific, world-wide collection of MINERAL, GEM and SEMI-GEMSTONE species — CRYSTAL groups, ROCK PICTURES, Etc. Visitors welcome. C. C. BOAK, 511 Ellis St., Tonopah, Nev.

GENUINE AND SYNTHETIC STONES accumulated from our vast gold-buying. Approval shipments sent collectors upon request. Advise your needs. B. LOWE, Holland Bldg., St. Louis 1, Mo.

ASSORTED GEM SLABS $3.00 lb. plus postage. ART OF GEM CUTTING, THE AGATE BOOK, LAKE SUPERIOR AGATES $2.00 each postpaid. Price list on request. KEWEENAW AGATE SHOP, Ahmeek, Mich.

U.S. GEOLOGICAL SURVEY BULLETINS, other publications, back numbers bought & sold. Also files of periodicals. J. S. Canner & Company, Inc., Boston 19, Mass.

SPECTROSCOPE for quick ore and mineral identification. Postpaid $3.00. CUTTING TEC. CO., Los Altos, Calif.

BARGAIN Jewelers 4X Eye-Loop, frees hands for examining minerals, etc. $2.50 value, $1.25. Anelag, Box 141ES, Rochester, Wisconsin.

CUTTING MATERIAL. Agates, Poppy Jasper, Rhodonite and others. $1 lb., postage extra. Al Thrower, P.O. Box 305, Santa Cruz, Calif.

MINERAL COLLECTION for sale. 200 specimens, some fossils and fluorescents. $50. Guild, 630 Greenleaf Ave., Wilmette, Ill.

FOSSIL TRILOBITES, Ill. & Utah specimens, large size $2, medium size $1.50, small $1. These are flat. N. Carter, Elkhorn, Wis.

WANTED—will pay $1 each for copies of August and September, 1946, and March, 1947 Earth Science Digest, and 50c each for October and December, 1946; Sept.-Oct., 1947, and January, 1949 issues. EARTH SCIENCE DIGEST, Box 1357, Chicago 90.

"COLORADO GEM TRAILS"—by Richard M. Pearl, revised edition available. Reduced, $2.25 postpaid. MINERAL BOOK CO., Box 183, Colorado Springs, Colo. Absolutely limited edition.

TEN MINERAL SPECIMENS for $3.00 every month. Range in size from one inch to one foot and in value from a dime to $2.50. More for your money by buying under this system. Send for plan describing special advantages for beginners as well as advanced collectors. If you include $3.00 for first set of minerals you will receive a free specimen of a fluorescent Florida mineral. MONTHLY MINERALS, 826 S. Ingraham Ave., Lakeland, Fla.

NEW CONCEPTS CONCERNING TRANSFORMATION OF ELEMENTS

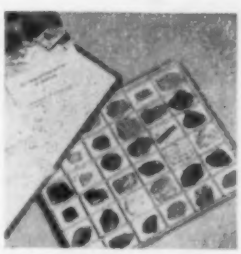
For a long time, it has been generally known that certain elements, those listed above lead in the atomic number series, were radio-active. That is, they were all slowly radiating energy in the form of subatomic particles, alpha and beta rays, thereby gradually disintegrating and stepping down to the elements of lower atomic number until the bottom of the series was reached, all eventually ending up as one of the isotopes of the element lead.

Below lead, it was once thought that all were stable, and that these elements remained the same, unchanged throughout all eternity. It is now believed, and demonstrable, that even the elements of lower atomic number are also wasting mass at almost inconceivably slow rates, and all will eventually revert to hydrogen, that pristine element from which all others were originally formed upon that vast creative explosion which started the whole matter,—energy,—electricity cycle going in the beginning of time.

How little we really yet know about what we think we know!

WARD'S MINERAL COLLECTIONS

There Are None Finer for Giving— Or for Your Own Enjoyment



MC100. WARD'S STUDENT COLLECTION OF MINERALS. The finest collection for the beginner. 36 selected minerals about 1"x 2", identified, with descriptive manual, attractive collection box. *$9.30 (illust.)*

MC102. STUDENT REFERENCE COLLECTION. Contains 110 accurately identified, thumbnail specimens, fully labeled to name and locality. *($5.00)*

Prices are List at Rochester, N.Y. Write for circular 352 (Geological Collections) for additional information and other price lists.

Write for free copies of: Geological Supplies and Equipment, Fine Mineral Specimens, Meteorite list. Geological materials ($ .75).

WARD'S NATURAL SCIENCE ESTABLISHMENT, INC.
3000 RIDGE ROAD EAST • ROCHESTER 9, NEW YORK

NEW CATALOG

Now! A 56-page catalog on minerals and mineral accessories. NOT a lapidary catalog. No charge except 5¢ for postage and handling. Send for it now.

MINERALS UNLIMITED
1724 University Avenue
BERKELEY 3, CALIFORNIA

GEODES

A fine collection of geodes from the Warsaw Formation. Many different types of one inch to twenty inches in diameter, perfectly cracked with matching halves, ready for immediate shipment.

Write for free price list

At last—a specimen for the collector which has utility. Geode Ash Tray with rugged aluminum base, felt bottom, and geode permanently mounted. Postpaid anywhere in U.S.A.—$1.00.

Keep those magazines in place with a set of Geode Book Ends. Matched pair, with beautiful specimens permanently mounted. Postpaid $3.75.

THE SMITH'S GEODE INDUSTRIES
411 W. Main St. New London, Iowa

IDAHO GEM MATERIALS

Cab Blanks—Irregular pieces of slabbed gem material ½"x ¾" to 1½"x 1½". This is fine material for beginners since it consists of all kinds, colors, and not expensive. 50 for $2.50 plus 35c postage and insurance. 25c extra for identification.

Jumbo Cab Blanks—Small slabs 1½"x 1½" to 2"x 3" at 25c each or 10 for $1.50. It is mixed material at prices that were formerly marked up to 50c. It's another beginner's bargain.

HIGHLAND PARK SAWS AND LAPIDARY UNITS
FELKER BLADES
POLLY ARBORS
BLANK MOUNTINGS

STEWART'S GEM SHOP
2620 Idaho Street
BOISE, IDAHO

OUR NEWEST OFFERINGS

OPAL: Australian, Andamooka variety, colorful seam type suitable for cutting solid stones or for making doublets. Contains some of the much sought after "blue-green" material. Per ounce (Troy) 5.00

MOONSTONE: Ceylon, a unique offering of this scarce rough, famous for its blue chatoyancy. Limited stock, pieces average 1 gram (5 carats) each. Per gram, 25c

HESSONITE: Garnet, Native cut stones of this truly rare collectors gem very suitable for recutting. You probably will never see any of this in the rough state. All good orange color showing typical imperfections of this variety. Sizes, to 4 carats. Per carat, $1.50

STAR SAPPHIRE: Ceylon, genuine, native cut, grey-blue stones that can be recut and re-oriented to advantage. All show indications of stars. Sizes to 5 carats, 50c per carat
Sizes to 20 carats, $1.00 per carat

PREFORMS: Blanked material of Thulite, Epidote, Turquoise, Amazonite, and Amethyst Quartz, guaranteed to finish 10x8 to 16x12mm. 5 assorted for $1.00

GARNET: Madagascar, an old stock off the market for 30 years, mine run, good color, Pyrope, commercial cutting. Some preformed material for sizes 9x7, 10x8 and some 12x10mm. Average 100-125 pieces to the pound. Per pound $18.00
Per ounce, $ 1.50

GOLDEN TIGEREYE: Our finest honey colored, silky, choice grained material, thick veined for "eye" and "bullseye" cutting. 100% cuttable. .5 pound lots for $5.00

ROUGH SAMPLER PARCEL No. 1: Guaranteed to contain 11 choice selected pieces of rough gemmy materials. Total weight to be over 1 pound (16 oz.), every piece to cut several choice cabochons. Contains generous portions of blue tigereye, amazonite, epidote, tigereye, sodalite, rock crystal, chrysocolla, black matrix turquoise, amethyst quartz, agate and rose quartz. This is the same high quality rough from our previous ads only in smaller quantity.
11 choice rough gem cutting pieces. Total 1 pound. For $5.00

Please add postage on above materials plus 20% Federal Tax
Rough material listing free. All money back guaranteed.
Our cut gemstone catalog, "A Guide For Gem Buyers," 25c

International Gem Corporation

Precious and Semi-Precious Gemstones

15 Maiden Lane ***Telephone:*** **COrtland 7-0156** **New York 7, N.Y.**

Hello Folks!

Now I Know Two Things . . .

1. The word Alaska has appeal to collectors
2. It pays to advertise . . . My fine Tertiary Leaf Imprints are all spoken for. My best cutting material, Polychrome Pebbles, are also "petuk."

We offer for immediate shipment:

SELECTED ARCTIC OCEAN SAND CALCITES, 2 inch or larger, $1.29; 1 inch or larger, 2 for $1.29; ½ inch or larger, 3 for $1.29. The smaller ones are fully as attractive as the larger.

BLUE BIRD BLUE VIVIANITE NODULES, 3 inch, $1.29; 2 inch, 2 for $1.29.

PASTEL PUMICE, it floats and glistens, from Mount Katmai eruption of 1912, beach rounded; pinks, yellows, pale green, 1 3 inch, 75;c 1 2 inch 55c.

CHERT, OBSIDIAN, IVORY AND BONE PROJECTILE POINTS from middens at ancient Eskimo village sites, 50c to $2.50.

HARPOON HEADS of bone and ivory, some etched and carved, of "Old Bering Sea culture" and earlier, $1.00 to $5.00. Harpoon Heads with points of stone or metal, $3.00 to $10.00. Ancient Adz and Ax Bits of Kobuk Jade, $2.00 to $25.00. These are too valuable as artifacts to cut, but you might want to polish one or more sides. Write for description as to size, weight, color and condition of cutting edge.

OLD WALRUS IVORY LABRETS, cone-shaped, from middens, 60c to $1.10.

WALRUS TEETH (grinders), some new, some old, 60c to $1.00. Unique and attractive cabochons may be cut from last two items.

The above all postage paid, no order under $1.29; if payment is by check add 11c for exchange.

Hat-shaped, etc., labrets of serpentine and other stone a matter of correspondence, which is always welcome. As I am moving, I trust, to the States in November I do not wish to trade for ANYTHING. Fifty years' gathering is too much to move now.

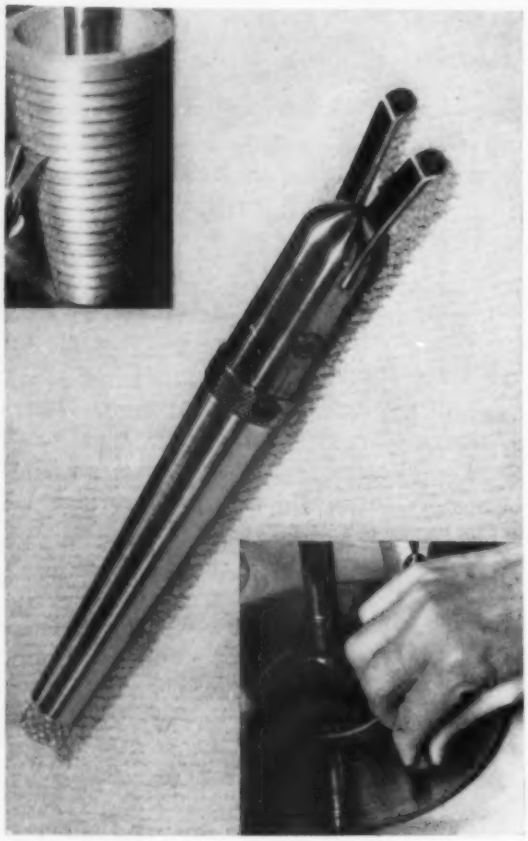
FRANK H. WASKEY

DILLINGHAM

ALASKA

WILLEMS FACETING DEVICE

No Other Faceting Unit Has All These PERTINENT FEATURES



- **Precision made of stainless steel and aluminum**
- **Adaptable to all makes of lapidary equipment**
- **Ultimate in flexibility for all cuts**
- **Jamb peg method eliminating uninteresting mechanical operations**
- **Ease and speed of inspecting cutting progress**
- **Fits the hand in a natural and comfortable manner**
- **Priced at only $17.00 at the dealers listed**

The Hundreds of Satisfied Owners of the Willems Faceting Device Attest to its Popularity

Gem Exchange
Bayfield, Colorado

J. Daniel Willems
Lock Box 1515
Chicago 90, Illinois

Technicraft Lapidaries Corp.
3560 Broadway
New York 31, N. Y.

Minerals Unlimited
1724 University Avenue
Berkeley 3, California

Akron Lapidary Company
1095 Chalker Street
Akron 10, Ohio

Michigan Lapidary Supply & Research Co.
332 Hamilton Street
Birmingham, Michigan

Tom Roberts Rock Shop
1006 S. Michigan Ave.
Chicago 5, Illinois

Ward's
Box 24, Beechwood Sta.
Rochester 9, New York

International Gem Corp.
15 Maiden Lane
New York 7, N. Y.

Eckert Mineral Research
110 E. Main Street
Florence, Colorado

The Mills Co.
108 N. Commerce
Fort Worth 2, Texas

East Coast Mineral Corp.
440 Columbus Avenue
New York 24, N. Y.

Adobe Crafters
Sante Fe, New Mexico

A. Joseph Alessi
430 S. Highland Ave.
Lombard, Illinois

DEALERS INQUIRIES INVITED

LAPIDARY INDUSTRIES 5901 WINTHROP CHICAGO 40

$1.00 GET-ACQUAINTED BARGAINS

18" STERLING SILVER or GOLD FILLED NECKCHAINS .....2 for **$1.00**

MAGNIFICENT BLUE TIGER EYE — new, superb stock .....3 sq. in. for **$1.00**

INCA ROSE RHODOCHROSITE—Argentina. Banded rose, pink and cream. OUTSTANDING, RARE, BEAUTIFUL. GUARANTEED TO PLEASE .....2 sq. in. for **$1.00**

RING SIZED CABOCHON PREFORMS of **BLUE TIGER EYE AND RHODOCHROSITE.** A regular $1.75 value. .....**BOTH FOR ONLY $1.00**

SNOW FLAKE NEPHRITE JADE—Wyoming. A new outstanding Jade of pleasing green colors with mottled light spots that will take a **PERFECT HIGH GLOSS POLISH.** A fast seller in our shop. .....**CHOICE SLAB $1.00**

BRAZILIAN AGATE SLABS—Banded Grey or light Carnelian .....10 sq. in. for **$1.00**

YELLOW TEMPSKYA FERN — Petrified. Rough has sold for $5.00 per lb. Sawed blocks about 6-8 oz. .....per block **$1.00**

PENDANT FRAMES—Gold Plated 1⅜" diameter. Sold for $1.00 each. .....**NOW ONLY 4 for $1.00**

SCATTER PIN BROOCH MOUNTINGS — Gold Plated. 9/16" diameter. Were $1.00 each. .....**NOW ONLY 4 for $1.00**

ROCK CRYSTAL STARS—5 Pointed Faceted Star. Drilled .....ea. **ONLY $1.00**

OUTSTANDING VALUES YOU WON'T WANT TO MISS

"UNBELIEVABLE BUT TRUE" 8x10mm. FACET CUT GEMS OF SYNTHETIC SPINEL, your choice of AQUAMARINE, BLUE ZIRCON, PERIDOT, GREEN TOURMALINE, BURMA BLUE OR WHITE SPINEL. **$1.00** each or .....4 for **$3.00**

18" STERLING SILVER or **GOLD FILLED NECKCHAINS.** SUPER BUY ..dozen **$4.50**

STERLING SILVER EARWIRES for unpierced or pierced ears .....dozen **$1.00**

JUMP RINGS—Sterling Silver or Gold Filled. 1 gross asst. box .....gross **$1.75**

All Above Items Subject to 20% Federal Excise Tax

SILVER WIRE ASST. 1 ft. ea. 14 gauge round, ½ round, square, round bead, and ½ round bead. $2.10 value for ONLY **$1.50**

SENSATIONAL BEZEL WIRE BUY — Machined straightened 1 foot lengths of Sterling Silver BEZEL WIRE at lower prices than hand cut stock from bulk rolls. SIX ONE FOOT LENGTHS—Plain and Fancy BEZEL WIRE **$2.45**

TURKS HEAD STERLING SILVER SQUARE WIRE. This wire has been polished after it has been drawn through the wire forming die. Ordinary wire usually is covered with die scratches. This special TURKS HEAD WIRE has a perfectly smooth polished surface. It has been machine straightened and cut into 1 foot lengths. No extra charge is made for this special processing. ONE FOOT EACH SIZE 12, 14, 16 and 18 gauge POLISHED SQUARE WIRE. Value of ordinary wire is $2.05. THE ABOVE SIZES IN TURKS HEAD WIRE NOW ONLY **$1.55**

INDIAN SILVERSMITHING—by Ben Hunt. An extremely fine book with many color plates .....Per copy **$5.50**

JEWELRY MAKING—by Bovin. Very outstanding new book with special instructions on stone setting and centrifugal casting .....Per copy **$2.50**

SEND FOR OUR FREE 56-PAGE PRICE LIST

NOTE—Our Current Catalog Is the Same as Our 1952 FALL PRICE LIST.

This Catalog Describes

TITANIA RAINBOW JEWELRY **GEM CUTTING EQUIPMENT AND SUPPLIES**
JEWELRY TOOLS **MATERIALS** **FINDINGS AND MOUNTINGS**
FLUORESCENT LAMPS **BOOKS** **PROSPECTORS PICKS**

Visit Our Store to See

THOUSANDS OF CHOICE MINERAL SPECIMENS, tremendous selection of sawed slabs for cabochons, rough gem stock, and select gem preforms. All prices F.O.B. Pasadena and subject to 3% California Sales Tax, if you live in California.

OPEN EVERY DAY EXCEPT SUNDAY, FROM 8:30 A.M. to 5:00 P.M.

OUR PHONE NUMBER IS SYcamore 6-6423

MEMBER: American Gem and Minerals Suppliers Association

GRIEGER'S

1633 EAST WALNUT STREET • PASADENA 4, CALIFORNIA

INDEX TO ADVERTISERS

APACHE TEARS **gem quality translucent smoky topaz, *Matched pair* of usable size 50c, copy of legend included.**

Satisfaction Guaranteed

LOST MOUNTAIN GEMS

BOX 5012 **PHOENIX, ARIZONA**

NEW GEM MATERIALS

While prospecting for Uranium we have discovered

TWO NEW GEM MATERIALS

in this State that are superior and different:

AGATE, yellow plume that does NOT undercut; 30c per inch or $1.00 a pound.

HEMATITE, polishes with a metallic lustre; walnut-size pieces, 10c per ounce, $1.25 a pound.

Taxes included, postage extra

ADOBE CRAFTERS

Rt. 2, Box 341 • Santa Fe, New Mexico

"FIRE AGATES"

From the famous California locality, containing deep fire of all hues. Care must be used in the grinding but the results are truly outstanding. Medium sizes $1.00 each.

Now in our new store

16208 S. Clark Avenue
Bellflower, California

SEND FOR PRICE LISTS
SLABS AND MINERALS SENT ON APPROVAL

See us in Booth No. 1 at the
Midwest Convention
June 26, 27, 28 at St. Louis
Missouri

CALIFORNIA
House of Rocks
16208 S. Clark Ave.
Bellflower, California

MINERAL NOTES AND NEWS

the magazine of

GEMS & MINERALS

The Rockhound's Own Magazine —owned by the California Federation of Mineralogical Societies. Covers the complete GEM AND MINERAL HOBBY field—collecting—gem cutting—field trips—Society news—dealer and supplier advertising.

OFFICIAL MAGAZINE OF AMERICAN FEDERATION AND CALIFORNIA FEDERATION

write for brochure or send ONLY

$2.00

for one year subscription
(12 full issues)

Mineral Notes and News

Box 716C **Palmdale, California**

YOU NAME IT — WE HAVE IT

We will answer your SPECIFIC inquiries in case the requested items are not advertised.

TERMS: C.O.D. only until credit established. No shipping charges if prepaid. Money on stock items refunded if they do not meet with satisfaction and they are returned within five days in the same condition they were sent.

BLACK STAR SAPPHIRE ROUGH

This material cuts beautiful black sapphire cabochons with little waste. All stones if properly oriented show asterism. However, we cannot guarantee the quality of the star you are cutting. It all depends on your skill and craftsmanship to create a real gem. All material runs from 4 to 20 grams per stone—**$1.00** per gram.

12 grams **$10.00** 28 grams **$20.00**

SYNTHETICS FACETED

Oval, octagon, cushion, standard cuts in all colors. (Emerald—split—brilliant cut.)

10x8	**$1.50**	2 for **$4.00**
12x10	**2.50**	2 for **6.00**
14x12	**3.75**	2 for **9.00**

MIRACLE STARS

These beautiful cornflower-blue and pigeon-blood-red cabochons, color of the finest star sapphires and rubies, show a six-rayed star under direct light.

1 star—**$1.00** 6 for **$5.00** 12 for **$8.75**

CAMEOS—INTAGLIOS

Warrior heads in Sard, Tigereye, obsidian, Hematite, Black and Green onyx. Shell Cameos with Ladies Heads approximately 16x12 **$1.75** 3 for **$3.50**

AMETHYST—TOPAZ—AQUA

Genuine flawless, emerald cut stones.

10x 8mm	1 for **$2.00**	3 for **$ 4.50**
12x10mm	1 for **4.00**	3 for **10.50**
*14x12mm	1 for **6.00**	3 for **15.00**
*16x12mm	1 for **8.50**	3 for **21.00**
*Aquamarines	plus **2.50**	3 plus **$6.00**

SCARABS

Finely carved beetles in black, blue, green, or red onyx. Amethyst, topaz, rose quartz, crystal, jade, etc. Hieroglyphics engraved on back as good luck charms. 14x10.

$1.00 each 6 for **$5.00**

Larger

Top quality **$1.50**.. ..6 for **$7.00**

STARS

	10x8		12x10		14x12	
	1 stone	3 for	1 stone	3 for	1 stone	3 for
Star Quartz, top quality fine star, also pink	**$2.50**	**$6.75**	**$3.00**	**$8.00**	**$3.50**	**$9.00**
Star Quartz, B. Quality	**1.00**	**5.00**	**2.25**	**6.00**	**2.75**	**7.50**
SYNTHETIC STARS, corundum, red, blue, pink. Alexandrite plus **$1.00**	**5.00**		**6.00**		**7.75**	

Linde synthetic star sapphires and rubies made in one piece. Sapphires from **$8.00** p. ct. Ruby from **$8.50** p. ct. up to **$12.00** p. ct.

COLLECTORS extra large, extra fine blue star quartz approximately ¾ of an inch **$20.00** per stone.

GENUINE STAR SAPPHIRES AND RUBIES

50 Genuine Star Sapphires ¾-1 ct. blue-gray with sharp star or blue with weaker star **$5.75** each, pair **$10.00**

30 Genuine Star Sapphires like above 2½-3½ ct. **$20.00** each, pair **$35.00**

10 Genuine Star Sapphires like above 4-6 ct. **$40.00** each, pair **$70.00.**

Larger stars up to 60 ct. from **$2.00** per ct. with weak star to **$75.00** per ct. gems.

Also larger gems up to 15 ct. from **$5.00** to **$125.00** per ct.

Black Star Sapphires from 2-10 ct. **$2,50, 5.50** and **$10.00** per ct.

CABOCHONS

	Medium Size		Large Size	
	1 stone	3 for	1 stone	3 for
Black onyx	**$ .75**	**$2.00**	**$1.00**	**$2.65**
Blue onyx (chalcedony), green onyx (chrysophrase), sard onyx (carnelian)	**1.00**	**2.50**	**1.50**	**4.00**
Tiger Eye (crocidolite) with perfect fine centered eye	**1.25**	**3.25**	**2.00**	**5.00**
Tiger Eye in commercial quality	**.60**	**1.50**	**.75**	**2.00**
Catseye Quartz fine centered eye in gray, green, blue, black, red, purple, honey color	**1.75**	**4.25**	**3.00**	**7.75**
Synthetic Ruby or any other color synthetic	**2.75**	**6.25**	**4.50**	**10.50**
Jade (nephrite) Wyoming, New Zealand or Alaska	**1.50**	**4.00**	**2.50**	**6.50**
Jade (jadeite) Chinese light to medium green			**1.75**	**4.25**
Same in better grade			**4.50**	**12.00**
Same in apple green, round	**6.50**	**10.50 pr. & up**	**12.50**	**20.00**

ASSORTED AGATES in sizes 12x10 to 16x12 like Carnelian, Rose Quartz, Turquose, Onyx, Western Agates, Lapis, etc. 3 for **$1.00**—7 for **$2.00.**

JADE FISHES

Approximately 1½ inches long. Drilled conveniently to spring link. Used for earrings, charms and pins. Fine detailed carved jadeite in wide color variety from white and green to yellow and peach. Pair **$6.50.**

COLLECTORS: extra fancy colors, purple, blue, gray, fine green or two and three colors. **$4.50** each.

JADE SEAGULLS—PIGEONS

With spread wings, **$8.50** per pair. Wing spread approximately 1½ inches.

BRILLIANT HEMATITE

Round 6 to 9 mm. full top and bottom faceted. Highly polished English Hematite.

$2.50 each 2 for **$4.00**

14x12 to 16x12

Oval onyx cushion faceted top, flat back.

$2.00 each 3 for **$5.00**

WE CARRY GOLD MOUNTINGS TO SET YOUR STONES

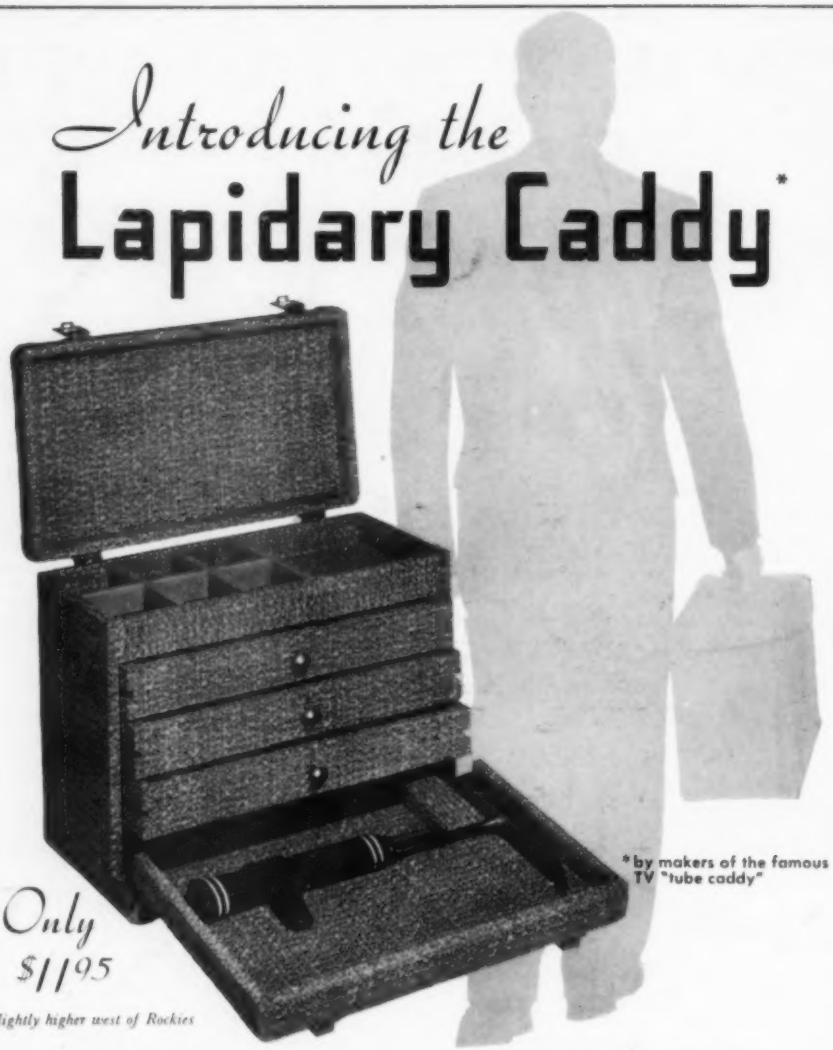
Diamond Cutters—Polishers, Precious, Semi-Precious & Synthetic Stones, Cultured Pearls

New England Diamond Corp.

43 WEST 47th STREET
NEW YORK 36, NEW YORK
PLaza 7-0647-8

Introducing the

Lapidary Caddy*



*by makers of the famous TV "tube caddy"

Only $11.95

Slightly higher west of Rockies

Newest, NEATEST Way to Keep Your Collection

Keeps your specimens, stones, and jewelry ORGANIZED and TOGETHER. You can refer to them easier, show them off better. Or, you can take your entire collection anywhere—just as easily as a brief case—on a second's notice. Also serves as complete case for field trips, going to classes, etc.

Plenty of space for everything from rough samples to your most precious finished gems. Three sliding drawers. Carry unfinished material, camera, flashlight, etc., in open space at bottom. Cabinet overall 14 x 11¼ x 8 in. deep. Provision inside front cover for rock hammer (not included).

Exceptionally sturdy construction of 3-ply wood covered with scuff-resistant leatherette. Slip-apart hinges on front cover. Don't underestimate its ruggedness; it's built to give long service and carry plenty of weight. Workmanship fully guaranteed. Handsome gray color, smartly accentuated with brass-finished hardware. Ask your lapidary dealer, or if none nearby, send $11.95 and we'll ship parcel post. If not satisfied, return within 15 days for complete refund.

Inquiries invited from Lapidary Dealers

Craftsmanship in Cabinets

ARGOS PRODUCTS CO.

310 MAIN STREET • GENOA, ILLINOIS